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SUMMARY OF RECENT ABSTRACTS*

III. MALARIA†

[Continued from p. 282]

Treatment

By feeding mosquitoes on patients who had not responded to proguanil, Lacroix (p. 1219) was able to show that the gametocytes, as well as the trophozoites, had resisted the drug.

Single-dose treatment with chloroquine of *P. vivax* and *P. falciparum* malaria in India was successful, but Rao *et al.* (p. 991) found that *P. falciparum* did not respond so well as *P. vivax*. In a hyperendemic area of Kenya Brown (p. 990) reports a series of cases of cerebral malaria in African children, and emphasises the great value of a chloroquine salt given intramuscularly to children in whom intravenous injection would be difficult. Davis and Vanzan Pinna (p. 1194) report 2 cases of toxic reactions to chloroquine. In patients with *P. falciparum* malaria, treatment with chloroquine was rapidly effective, and prevented the development of gametocytes even if begun as late as the 8th day; Jancsó *et al.* (p. 7) found that the addition of primaquine eliminated the infectivity of gametocytes very rapidly, and pyrimethamine also rendered them non-infective. Nunn-Cancino (p. 121) used hydroxychloroquine successfully in the treatment of *P. vivax* infections; parasitaemia and fever were rapidly controlled.

Glanz (p. 786) reports a fatal case of agranulocytosis during treatment with amodiaquine for a skin sensitivity condition. The prolonged antimalarial action of pyrimethamine is well established, and Sarre and

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the Tropical Diseases Bulletin, 1937, v. 34. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on malaria in this series see the March and April issues of the Tropical Diseases Bulletin each year since 1936.

Ihrig (p. 1048) show that it can be detected in urine for 11 days and in serum for 7; it was not necessary to postulate more active folic-acid antagonists to explain the action. Young (p. 1049) tried pyrimethamine in *P. malariae* infection in neurosyphilitic patients, but it was not satisfactory.

Bruce-Chwatt and Charles (p. 1153) tested a new hydroxynaphthalene compound (377 C 54), finding that it had a pronounced schizontocidal effect against *P. falciparum*, *P. malariae* and *P. ovale*. It was well tolerated. In a single dose it was about one-half or one-third as active as chloroquine against *P. falciparum*.

Experience in ex-military personnel of the U.S. Army demonstrated the value of primaquine (15 mgm. base daily for 14 days) in preventing relapses of *P. vivax* malaria (Schwartz and Tuttle, p. 527). Prevention of transmission of *P. vivax* by mosquitoes from infected persons was obtained with small doses of pyrimethamine or of pyrimethamine with cycloquin (Tiburskaya, p. 923); for dosage the original abstract should be consulted. Quinocide [an 8-aminoquinoline] has been found useful by Lysenko (p. 924) in preventing relapse of *P. vivax* malaria in patients treated during attacks, and in combination with pyrimethamine it has been used successfully for prophylaxis. Chechelnitskaya and Baigulova (p. 1290) write very favourably of quinocide in the treatment of *P. vivax* malaria, and Tiburskaya (p. 1291) claims that experimentally in man, if given in the incubation period, it will prevent the disease.

Duffin and Rollo (p. 1161) tested a hydroxy-substituted naphthalene compound for activity against *P. berghei*, *P. cathemerium* and *P. knowlesi*. Its action is rapid. In human volunteers it reached a peak concentration in the blood in 2 hours and appeared to be retained in liver and lung.

Ruiz Sanchez *et al.* (p. 8) used tetracycline for malaria, with some evidence of success, but in comment Covell remarks that the antibiotics, for various reasons, are not likely to be useful.

Suppressive Treatment

Bruce-Chwatt (p. 533) discusses the possibility of eradication of malaria by drugs, concluding that although this is impossible with present preparations in general, the use of chloroquine and amodiaquine makes it possible in certain areas.

In the hyperendemic area of Gambia McGregor *et al.* (p. 389) conducted an experiment in which African children were given weekly chloroquine for more than 3 years, and were compared with control children not so protected; treatment for overt malaria was available for both groups, and all the children were kept under regular observation. The numbers were small; 5 of the 26 unprotected children and 1 of the 26 protected children died during the first 16 months, but the causes of death of the 5 unprotected children were not known. At the end of the

experiment both groups appeared to be equal in general physique and mentality. It seems that malaria increases the risk of death in the first 2 years but causes little illness afterwards. In comment Wright suggests that observations should be made on mortality after prophylaxis has been discontinued. In West Africa Schneider *et al.* (p. 1386) attempted chemoprophylaxis in children with 75 mgm. chloroquine base and 6·25 mgm. pyrimethamine once each week. There was a dramatic fall in spleen and parasite indices at first, but in the later months it became evident that resistance of the parasite to pyrimethamine had developed, and the combination was rendered comparatively ineffective. Chloroquine alone, in weekly doses of 300 mgm. base, continued to be satisfactory.

In a group of Nigerian schoolchildren given prophylactic pyrimethamine during a period of 2 years Archibald and Bruce-Chwatt (p. 780) found a rapid reduction of parasitaemia to zero, and only a few instances in which break-through occurred (apart from those in which administration of the drug was interrupted). The gain in weight of treated children was significantly greater than of controls. In part of Kenya where malaria is seasonally epidemic Roberts (p. 8) used pyrimethamine for mass prophylaxis at the relevant time of the year, with good effect on parasite rates and incidence of malaria, at the cost of less than 2 pence per person. In view of the possibility of development of resistance other drugs may be necessary in other years, though Wright, in comment, doubts if any other would achieve prolonged prophylaxis and sterilization of gametocytes simultaneously. Clyde *et al.* (p. 392) found that pyrimethamine was present in the milk of lactating mothers who had been given the drug, but not in proportion to the amount taken. Treatment of malarious infants in this indirect way is not satisfactory, and even for prophylaxis it is better to give the drug directly to the children (Clyde, p. 1154).

Fatal poisoning with pyrimethamine is reported by Davies (p. 264), Montauban *et al.* (p. 923) and Mathurin (p. 1154) in children who accidentally consumed large numbers of tablets; the danger of leaving this substance where children can reach it is to be stressed.

Malaria was virtually eliminated from French Guiana by 1953, but was re-introduced by immigrants from the Antilles who came to work in the sugar fields. Floch (pp. 130, 924, 1055) reports on the spread of the disease to those in the neighbourhood of the immigrants, and the use of amodiaquine and 8-aminoquinolines in controlling the outbreak. The real remedy would be eradication from the places from which the immigrants come.

Control: General

Russell (p. 645) sums up the present distribution of malaria in the world, showing that in the Americas, Europe and the Near East over half the exposed populations are now protected, but that in some other

areas the proportion may be as low as 4%. He (p. 1049) estimates that there are still some 200 million cases of clinical malaria each year. The modern concept is of eradication, but there are several stages in this programme—preparation; attack; consolidation; and maintenance during the period when malaria control becomes one of the routine activities of the public health service. High among the problems to be solved is that of resistance to insecticides, and on this subject knowledge is scanty and should be fostered. With proper development of skills, however, eradication is possible.

An issue of THE INTERNATIONAL DIGEST OF HEALTH LEGISLATION (p. 264) is devoted to malaria, and contains an analysis of the malaria control laws of some 20 countries. An account of malaria control legislation in Spain is given by LOZANO MORALES (p. 646); it relates to the financing of local schemes.

A general account of malaria, written for planters and miners, has been brought up to date by MACDONALD (p. 1388). The emphasis is on control, including chemoprophylaxis and the use of insecticides, and there is a discussion on resistance to insecticides.

SWELLENGREBEL and KRAAN (pp. 122, 1050) discuss the periodicity of malaria in North Holland in the past, which they are unable to attribute to fluctuations in the density of anophelines. The recent decline in anophelines is not due to deliberate control or the agricultural use of insecticides, and that of *A. m. atroparvus* is not likely to be due to changes in salinity of the polders, since there has been no corresponding increase in *A. m. messeae*. Control as now practised consists of selective spraying of particular localities and deliberate search for residual cases of the disease.

CIUCA *et al.* (pp. 1291, 1389) discuss malaria in Rumania and the results of control campaigns undertaken in the years 1947–55. During the war there was a disastrous increase in malaria, culminating in a *P. falciparum* epidemic in 1946 and this led to a vigorous programme of free distribution of chemoprophylactics which effectively checked it. Later the residual insecticides were used, with such success that since 1952 their use has been confined to the spraying of houses in which cases of malaria occur, and a few neighbouring houses.

In Israel *A. sacharovi* has now been eliminated; except in one region *A. superpictus* and *A. claviger* are of limited importance and *A. sergenti* is now the main vector. SALITERNIK (p. 9) shows that malaria has been reduced from 1·01 new cases per 1,000 population in 1949 to 0·05 in 1955 in spite of the high incidence in new immigrants. *A. sergenti* is an efficient vector wherever it exists. FARID (p. 788) recommends that indoor residual spray should be applied to every kind of structure within 6½ km. of its breeding places and a month before the seasonal peak is due. If this is not possible, larvicidal treatment with chlorinated hydrocarbons should be used so long as there is no sign of resistance, and even Paris green or oil may be used. Drug prophylaxis and education are also

needed. In Syria rice fields provide breeding places for *A. hyrcanus*, *A. sergenti* and *A. pulcherrimus*, and malaria is present near them, almost certainly transmitted by *A. sacharovi* and *A. superpictus*. FAKIR (p. 789) envisages a system of strict control over the cultivation of rice.

In Saudi Arabia the 3 vectors of malaria are *A. gambiae*, *A. sergenti* and *A. stephensi*, and malaria is endemic. FARID (p. 647) comments that the Mecca pilgrimage will take place in the transmission season during the next 25 years, and many pilgrims will come from countries where eradication is in progress; he mentions some of the control programmes instituted in Seddak, Mecca and other places.

VINCKE (p. 787) discusses the control of malaria in Africa south of the Sahara, concluding that an association of chemoprophylaxis with insecticidal attack would be appropriate, and that for success a much improved system of public relations and education is needed, in which sociologists would help. The psychological processes of the people, and the habits of *A. gambiae*, both need study. In the French Cameroons LANGUILLON (p. 10) found that the gametogonic index (the number of gametocyte carriers in persons with *P. falciparum* in the blood) had not been reduced as a result of control of adult mosquitoes by insecticides. He concludes that if the insecticide campaign were discontinued there would be rapid multiplication of the parasite, and suggests a gametocidal attack as well as insecticide control.

Swaziland was formerly a country of varying degrees of endemicity of malaria, but MASTBAUM (pp. 10, 1053, 1390) shows that applications of BHC once or twice each year since 1949 have almost eliminated it. *A. funestus* has gone but *A. gambiae* remains. Spraying has now been discontinued over part of the area but a *cordon sanitaire* is maintained on the periphery, where spraying is continued. An encouraging experiment in chemoprophylaxis with a single dose of 300 mgm. chloroquine followed by 25 mgm. pyrimethamine each month is reported in one area where spraying was not enough; results were very satisfactory.

Although *A. minimus* was the chief vector some years ago in the Terai area of Uttar Pradesh, it has now disappeared though *A. fluviatilis* persists. CHAKRABARTI and SINGH (p. 1054) consider that this is because the area was at the periphery of its distribution range, where it was particularly susceptible to change in environment and to methods of control, which have been features of recent activity.

A study of the resting habits of *A. culicifacies* near Delhi showed that it tended to rest on ceilings and the upper part of walls; BHATIA *et al.* (p. 1287) conclude that any spray programme must ensure complete cover of ceilings and walls above 3 feet from the floor.

GUNARATNA (p. 648) gives an account of malaria control in Ceylon, where spraying has been discontinued in some of the controlled areas, a vigilance staff being left to detect any change. In the dry zone vector control was impracticable because of shifting cultivation and here the emphasis of the vigilance staff is on detection and treatment of cases.

Treatment and spraying are started if foci of transmission are discovered. In 1955, 2·2% of 93,299 blood films were positive.

In Malaya antilarval measures are preferred for urban areas and house-spraying for rural areas where houses are scattered. WILSON and EDESON (p. 1155) show that antimosquito measures are used wherever possible but suppressive therapy has a place for visitors to malarious areas.

In Taiwan malaria has been reduced to a minor public health problem as a result of several seasons of insecticide spraying, and CH'EN and LAING (p. 650) give an account of the surveillance units which take note of any recrudescence.

GABALDON (p. 652) shows that in the worst areas of Venezuela the reservoir of malaria was virtually eliminated after 4 years of spraying. Malaria transmitted by *A. aquasalis* and *A. núñez-tovari*, which bite and rest out of doors and are not affected by residual spraying, created difficulty there and may do so elsewhere.

PESQUEIRA (p. 1157) describes the malaria situation in Mexico and the plan organized with the object of eradication of the disease.

No indigenous case of malaria has been found in Martinique since 1952, but cases still occur in immigrants from neighbouring infected islands; MONTESTRUC and BERDONNEAU (p. 267), however, remark that *A. aquasalis* can still be found there.

The decrease in malaria in French Guiana as a result of the widespread use of DDT has apparently had a notable influence on the ratio of live births to deaths, and FLOCH (p. 652) shows that infant mortality has fallen in recent years from 90 to 52 per 1,000 live births.

Larvicides: Resistance to Insecticides

It is proposed to use cetyl alcohol to check the evaporation of water from dams in Tanganyika; MSANGI (p. 393) shows that it has no ill effects on mosquito larvae but does not interfere with the action of Malariol HS larvicide.

HAWKINS (p. 394) shows that ethyl alcohol, which is often used as a solvent for DDT in larvicide tests, has an enhancing effect on DDT, and that the usual practice of subjecting control larvae to the action of a solution of solvent alone is not a critical test of the action of the solvent in the presence of DDT.

COLLINS (p. 393) gives an account of methods used for the control of mosquito larvae in the Naval Base, Singapore, which was left in a poor state at the end of the war. The old methods of destruction of breeding places and drainage have been used, with larvicidal work in which DDT and an emulsion of dieldrin were employed. It was found that resistance developed to dieldrin, and the original anti-malarial oil has therefore been re-introduced.

The development of resistance to DDT in larvae of *A. stephensi* from wells which had been treated with a kerosene-DDT-soap emulsion is described from India by RAJAGOPALAN *et al.* (p. 126). In Middle Java

Chow and Soeparmo (p. 790) report resistance to DDT in *A. sundaicus*, possibly the result of the use of DDT in larvicides. Hadaway and Barlow (p. 534) show that *A. stephensi* and *Aëdes aegypti* are least susceptible to DDT and dieldrin 24 hours after a blood meal. Seasonal differences in susceptibility of *A. maculipennis* to DDT in Iran led de Zulueta *et al.* (p. 1052) to think that resistance may be associated with increased lipids due to fat-body development.

Raffaele and Coluzzi (p. 925) report studies which indicated considerable resistance of various Italian anophelines to DDT, but they note that good results are obtained in the field with DDT. Busvine comments that this anomaly may be related to the techniques used. In Sicily Mariani (p. 122) has found no change in the susceptibility to DDT of *A. m. labranchiae*, *A. superpictus* and *A. claviger* during 8 years of systematic house-spraying, and suggests that this may have been due to the fact that larval breeding places were left untreated and that chlorinated hydrocarbons were sparsely employed in agriculture. In the Tennessee Valley area recent tests by Smith (p. 266) indicate that there has been no significant diminution in the susceptibility of *A. quadrimaculatus* to DDT since 1944, though it has been used regularly.

In Nigeria Ramakrishna and Elliott (p. 1052) found *A. funestus* less susceptible than *A. gambiae* to DDT but more susceptible to BHC and dieldrin.

By using radio-active preparations Bradbury and Standen (p. 266) found no difference between strains of *A. gambiae* resistant or susceptible to BHC in absorption of BHC or in conversion of small amounts to water-soluble products. Earlier results in house-flies had indicated that resistant flies converted far more to water-soluble products. In experimental work Davidson (p. 124) shows that a strain of *A. gambiae* from Nigeria was susceptible to DDT, pyrethrin and malathion, but was very resistant to dieldrin and related compounds, which are shown in order. He (p. 124) shows that inheritance of this resistance is monofactorial with incomplete dominance, and discusses the need for a new approach to testing for resistance in wild populations of mosquitoes suspected of resistance, which he elaborates. In the report of the Malaria Control Project in Western Sokoto Bruce-Chwatt and Haworth (p. 123) comment on the resistance to dieldrin which has developed in *A. gambiae* since 1955; this led to a reversal of the original marked downward trend of both anophelines and malaria, and a similar feature was also observed in the BHC zone, and even in 2 places in the DDT zone. Investigations on the chemistry of insecticides are recorded in an appendix to this report. Holstein (p. 1045) shows that the chromosome structure of a strain of *A. gambiae* resistant to dieldrin was different from that of certain non-resistant strains, but the implications of this finding need elucidation.

In part of Mississippi the local strain of *A. quadrimaculatus* has developed a high degree of resistance to dieldrin, chlordane and BHC, but

not to DDT although this has been used extensively (MATHIS *et al.*, p. 6). JONES (p. 1156) has devised a test for measuring the tolerance of DDT by larvae and pupae of *A. quadrimaculatus*.

VARGAS *et al.* (p. 1055) describe their methods of testing the susceptibility of Mexican anophelines to DDT.

Insecticides: Repellants

In Afghanistan malaria is associated with irrigation, mainly of rice-fields, and transmission is seasonal. DHIR and RAHIM (p. 1391) report that a single application of DDT is made in rural areas and that DDT is used as a larvicide in towns. Results over a number of years have been good.

The successful control campaign adopted in the Himalayan foothills, in which DDT and (in the early stages) prophylactic proguanil were used, is described by RAHMAN *et al.* (p. 126).

After a test in Mysore State BHOMBORE *et al.* (p. 533) concluded that in an area with a transmission period lasting 6 or 7 months a single application of DDT at 100 mgm. per sq. ft. is economically ideal. The vector was *A. culicifacies*, but *A. fluviatilis* was also suspected.

A. minimus is the vector in Thailand, and it is being controlled with DDT. Spraying is discontinued when the usual indices reach a certain low value and AYURAKITKOSOL and GRIFFITH (p. 649) describe the vigilance arrangements in force to detect recrudescence in the areas where spraying has ceased.

In Dutch New Guinea, where malaria is regarded as largely holo-endemic, the vectors are *A. punctulatus*, *A. farauti* and *A. koliensis*. METSELAAR (pp. 651, 652) describes an insecticidal campaign with DDT in one area, which greatly reduced but did not stop transmission, and remarks that complete interruption of transmission might not be possible with insecticides alone, but might be possible with the concurrent use of drugs.

In investigations carried out in Malaya REID and WHARTON (p. 127) point out that except for *Culex pipiens fatigans* the species to be controlled do not habitually rest indoors and the anophelines probably seldom touch the walls before biting, and eradication by spraying seems to be unattainable. The various mosquitoes vary greatly in susceptibility. Even with high doses, unless they are repeated with uneconomic frequency, disease vectors other than *A. maculatus* are not likely to be controlled, but dieldrin at 100 mgm. per square foot is non-irritant and long-lasting, and may be the most promising for Malaya and for countries where mosquitoes rest indoors by day. DDT is irritant and persistent, but not toxic enough. BHC is very toxic but does not remain effective long enough.

Diethyl toluamide is a new repellent which retains its activity for 18–20 hours, against 4–4½ hours for a dimethyl phthalate cream (CLYDE and KINGAZI, p. 1155).

Malaria of Monkeys: Hepatocystis kochi

Wolcott (p. 1057) discusses the chromosomes of various plasmodia; species appear to fall into 2 groups—(a) with 2 equal chromosomes (including saurian and avian plasmodia, and *P. berghei*); (b) with 2 unequal chromosomes (these include the human plasmodia and *P. knowlesi*).

Jaswant Singh *et al.* (p. 11) found that in tuberculous monkeys with malaria the density of parasitaemia (*P. knowlesi* and *P. inui*) was much less than in non-tuberculous monkeys, possibly because the tuberculous monkeys suffered from protein or ascorbic acid deficiency.

Jaswant Singh *et al.* (p. 11) found sulphadiazine much more effective than a sulphonamide substituted dihydrotriazine and a proguanil metabolite in *P. cynomolgi* infections. They (p. 130) report on the action of small doses of chloroquine and quinine on monkeys infected with the Nuri strain of *P. knowlesi*. They note that in animals with parasitaemia over 40% life can be saved only if blood transfusion is combined with chemotherapy. They (p. 131) found a severe fall in blood sugar in monkeys infected with the Nuri strain, but only when parasitaemia had reached a high density. This may be the result of extensive centrilobular necrosis of the liver.

Bleeding time and coagulation time were both reduced in monkeys infected with the Nuri strain, but the platelet count remained much the same (Nair and Menon, p. 131).

Bray (p. 653) describes *P. reichenowi* in chimpanzees in Liberia; it closely resembles *P. falciparum* but the host specificity probably validates this specific status. Garnham *et al.* (p. 1292) studied *P. schwetzi* and *P. reichenowi* in a chimpanzee from Liberia, showing that chemotherapy failed to remove *P. reichenowi*, which indicates that in contrast to the allied *P. falciparum* exo-erythrocytic schizogony persists beyond the pre-erythrocytic stage. *P. vivax* was inoculated into the animal and persisted for several months. *P. malariae* was also inoculated and persisted, running a mild course with recrudescences. Mosquitoes could be infected with the *P. vivax* but not with *P. malariae*.

The mode of transmission of *Hepatocystis kochi* has not been found. Garnham (p. 795) thought that ticks might be involved, since they carry other parasites of monkeys, but investigation did not produce evidence that this was so.

P. berghei

Sergent and Poncet (p. 12) studied the morphology of *P. berghei* in rodents, noting the predilection for reticulocytes, and describing 2 types of schizogony, in mature cells and reticulocytes on the one hand, and in polychromatophils on the other. These last do not seem to be very suitable for the parasite. No exo-erythrocytic stages were found. They (p. 791) describe the course of infection in white mice (very susceptible) and white rats (which have considerable innate resistance). There was

wholesale destruction of red cells in the mouse, but in the rat the first loss of red cells was halted and the number gradually returned to normal. Details should be sought in the original. They (p. 926) inoculated *P. berghei* into the North African gerbil *Dipodillus campestris*, but found it resistant.

Sergent and Poncet (p. 927) could not find that, in infection of white rats with both *Spirochaeta hispanica* and *P. berghei*, either infection influenced the course of the other.

Voles infected with *Schistosoma mansoni* and *P. berghei*, at about the same time, did not seem to be able to suppress the blood parasites, but Yoeli (p. 927) found that if the *P. berghei* infection was induced considerably later than the *S. mansoni* infection, the voles were better able to withstand it. The reticulo-endothelial system was presumably "alerted".

Molinari and Montézin (p. 536) found that *P. berghei* remained infective to mice after exposure in citrated blood to temperatures of −79°C. and −180°C. for 1 hour, and Verain and Verain (p. 537) show that it remained viable after exposure to ultrasonic action for 15 minutes, but that at 40 minutes nearly all the parasites had disappeared.

Rats infected with *P. berghei* and subjected to hypoxia in a chamber simulating an altitude of 19,000 feet, were more severely affected than rats kept under normal conditions; Hughes and Tatum (p. 536) show that the additional stress caused by a concurrent infection with *Trypanosoma lewisi* had a similar effect to that of hypoxia.

Mercado and von Brand (p. 1392) show that the glycogen in the liver is depleted during infection with *P. berghei*, probably as a result of adrenal dysfunction and centrilobular damage to the liver due to anoxia. The simultaneous administration of fructose and steroids has a synergic effect on the synthesis of glycogen.

Depieds and Faure (p. 13) show that the ratio of total proteins to globulins is reduced in rats with *P. berghei* infection.

In a study of the course of *P. berghei* infection in mice Carrescia and Arcoleo (p. 397) show that intraperitoneal inoculation was always successful whereas subcutaneous inoculation failed in one-third of cases. The pre-patent period was affected by the route and number of parasites. The mice died with symptoms of severe anaemia, and the level of parasitaemia at death was correlated with the proportion of reticulocytes (which rose to 45%).

Serum from rabbits which had received a course of 6 injections of *P. berghei* was found by Warburg (p. 13) to have a rather greater protective action than normal serum on injection into hamsters inoculated with *P. berghei*, but similar experiments with mice did not show any effect of either serum on the course of the disease.

Fabiani and Orfila (p. 13) studied the course of intraperitoneal inoculation of rodents with *P. berghei*, in relation to maturation of reticulocytes and to the effect of immune serum on phagocytosis. In young rats inoculated with *P. berghei*, the prior injection of serum from

rats which had passed the acute stage conferred protection, but these authors (p. 537) show that serum taken before or during the crisis did not do so. They (p. 654) also show that infected sucklings aged 8–11 days were to some extent protected while taking mothers' milk in that parasitaemia from heavy inoculations was not so severe as in controls, but younger sucklings generally received no such protection, and in any case the antimalarial effect lasted only as long as the mice were fed by the mothers.

Zuckerman (p. 1391) studied *P. berghei* infection in rats in relation to reticulocytes and immunity, and concludes that reticulocyte replacement before crisis may endanger the host's life by intensifying parasitaemia because of increased invasion of the reticulocytes by merozoites, but once immunity has been acquired after the crisis the course of infection is not adversely affected by reticulocytosis, owing to elimination of merozoites. The paper contains much detail, which should be read in full.

P. berghei cannot pass through the intact placenta, but Werner (p. 396) has shown that after intraperitoneal inoculation of mice and hamsters before pairing or during pregnancy, half of the embryos were abnormal. He describes changes found in the placentas of dead embryos; those of malformed embryos showed no abnormalities. The parasites can pass the embryonic membranes if they are damaged (Kunert and Werner, p. 1056).

Hawking and Terry (p. 792) in an investigation of the effect of milk diet on *P. berghei* infection note that it is counteracted by para-aminobenzoic acid (PAB) with or without para-hydroxybenzoic acid. In comment Fulton points out that the significance of para-hydroxybenzoate for the nutrition of *P. berghei* has previously been recognized. On the assumption that in a population of *P. berghei* some individuals require PAB for growth and some do not, Ramakrishnan *et al.* (p. 397) attempted to isolate a "milk-resistant" strain by maintaining infected rats and mice on a milk diet in which PAB was considered to be negligible. They easily isolated a strain which did not require PAB, and found that it was resistant to sulphadiazine. In comment Fulton points out that no indication is given of tests for PAB in the milk used, or of how the strain behaved in response to sulphadiazine before isolation of the "milk-resistant" variety.

Sautet *et al.* (p. 535) found that the addition of milk, butter, calcium phosphate and cod-liver oil to a poor basal diet aided the survival of mice infected with *P. berghei* and treated with antimalarial drugs, but that the addition of alcohol or wine was deleterious. They (p. 1158) added various vitamins or cod-liver oil to the diet of mice being treated for *P. berghei* infection with different drugs, but it is difficult to arrive at a general conclusion from the results set out. Continuing their investigation of the effect of alcohol on the course of *P. berghei* infection, they (p. 793) show that the parasitaemia progressed more rapidly in the alcoholic mice, and that death occurred most quickly in mice given wine. Alcohol improved

the action of small doses of antimalarial drugs, but increased the toxicity of large doses (Pastacaldi *et al.*, p. 1158).

Fraser and Kermack (p. 793) investigated the inhibitory action of some antimalarial drugs on the hexokinase of *P. berghei*, but the validity of any theory of antimalarial action based on activity against parasite hexokinase would appear to be ruled out.

Raymond-Hamet (p. 1057) found 2 of the minor cinchona alkaloids, which did not possess a quinoline nucleus, useless in *P. berghei* infection.

Malaria of Birds

Huff (p. 1159) gives an account of the organ and tissue distribution of the exo-erythrocytic stages of various avian malaria parasites, which should be read in full.

McGhee (p. 1057) has been able to show that the erythrocytes of all the birds tested were susceptible to 4 species of bird malaria parasites. The findings also suggest that the invasion of erythrocytes is not effected by active penetration of the parasites but through a physico-chemical mechanism.

A fast-moving protein has been detected in avian malarial serum by Schinazi (p. 1059); it was not characteristic of malaria serum in general.

Rama Rao and Sirsi (pp. 132, 399, 535) show that complete depletion of thiamine in chicks inhibits the multiplication of *P. gallinaceum*; thiamine is important to the parasite, and when present in sufficient quantity enables it to multiply rapidly. Riboflavin is also required, and substances antagonistic to it may therefore be useful antimalarial drugs. PAB is also necessary to the parasite. Taylor (p. 1160) shows that addition of benzoic acid derivatives to a basal diet caused increase in *P. gallinaceum* parasitaemia, and deficiency of riboflavin lowered it.

Ray and his colleagues (pp. 399, 794) report the production of some degree of resistance to chloroquine in *P. gallinaceum*, by carefully graded doses over a long series of passages.

Greenberg (p. 14) reports experiments with mixed lethal strains of *P. gallinaceum*, some of which had been made resistant to pyrimethamine or metachloridine. The complicated results are indicated in the original abstract.

In experiments on chick embryos Vasina (p. 537) found that sulphadiazine and aureomycin had an action on the exo-erythroctyic forms of *P. gallinaceum*, but that mepacrine, proguanil and an 8-aminoquinoline (Chinocid) had no such action.

In attempts to immunize fowls against *P. gallinaceum* Deschiens *et al.* (p. 398) found that killed parasites alone or in paraffin gave little protection, but that killed parasites with BCG and paraffin, if this mixture had been preceded by separate injections of BCG and killed parasites, gave relatively high immunity, which was not the same as premunition.

McGhee (p. 14) studied the course of *P. lophurae* after 3 years of continuous passage through mice.

Changes in the infectivity of *P. relictum* for pigeons and canaries, in different circumstances, are reported by Schinazi and Ball (p. 795).

Rossan (p. 1058) investigated the effect of antimalarial drugs on *P. fallax* of the turkey; the paper is very full and details should be sought in the original. *Charles Wilcocks*

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

Languillon, J. Carte épidémiologique du paludisme au Cameroun. [**Epidemiological Aspects of Malaria in the French Cameroons**] *Bull. Soc. Path. Exot.* 1957, July–Aug., v. 50, No. 4, 585–97, 1 fig. Discussion 597–600 [Morin, H. G. S.].

The author briefly presents the results of a prolonged survey in the French Cameroons where the epidemiology of malaria may be considered in 4 regions: (a) the southern forest zone with a constantly humid climate and long rains, where spleen and parasite rates are normally high, averaging 54 and 59%, and where malaria is carried predominantly by *Anopheles moucheti* and *A. nili*, aided by *A. gambiae* where the natural forest has been broken down by man; (b) the mountain area to the west which is partly forested but has a more variable characteristic and climate. The spleen and parasite rates are on the whole higher, averaging 66 and 68%, but they may be low, 18 and 13%, in some fully cultivated and well planted areas. In the south transmission is the same as in the forest zone, while in the north *A. gambiae* and *A. funestus* predominate as carriers; (c) the savannah region with a much drier climate and relatively short rainy periods, where the rates are 58 and 57%; and (d) the arid semi-desert area to the north where transmission is by *A. gambiae* and *A. funestus*, and where the malariometric indices are 62 and 61%. In all of these areas *Plasmodium falciparum* predominates, *P. malariae* is relatively common, and a few examples of *P. ovale* have been found. It is suggested that the last parasite may be an adaptation to man of one natural to the monkey, support being given to the idea by the discovery of 4 examples of this infection with one of *P. schwetzi* in a small village in a forest in which there were numerous chimpanzees.

Professor Morin in discussion draws attention to the elaborate nature of the survey, to the diversity of conditions in different areas, to the possibility that *P. ovale* infection might well prove to be a zoonosis, and

the need for further study to enquire into this. He also draws attention to the variation in rainfall and climate from one year to another which necessitates prolonged survey and prolonged study of the results of control to ensure that like is in fact compared with like.

[The terms hyper-endemic and holo-endemic are used for classification but not in the sense of their original definition. It is perhaps time that these terms were recognized as colloquial descriptions and not as indicating some precise findings.] *G. Macdonald*

Hsieh, Hsien-Chen. **Studies on the Relationship of Palpable Livers to Malaria in Taiwan (Formosa).** *J. Formosan Med. Ass.* 1957, June, v. 56, No. 6, 241–51, 4 figs. [18 refs.]

Enlargement of the liver is common in Taiwan and has been associated with nutritional defects and various infective diseases, including malaria. The present studies concern this last relationship. Malaria control by residual insecticides was started in 1953; transmission has to a great extent been interrupted and the malaria incidence has greatly declined, but spleen rates remain for the present moderately high and a few parasite infections, mostly due to *Plasmodium vivax*, are still to be found. In addition to some adults, 4,357 children were examined in different parts of the island. 63·0% were found to have enlargement of the liver and 22·5% enlargement of the spleen. When these findings were classified according to the previous endemicity and present spleen rate of the place of examination, the frequency of enlarged livers was found to be 59·7% in places which had previously been non-malarious, 60·9% in places which had been moderately malarious and 83·5% in those which had been highly malarious. The results of correlating the size of liver, spleen rate and parasite rate were as follows:—

Liver size (Singh's method)	*Spleen rate*	*Parasite rate*
0	7·9	1·1
1	27·7	3·4
2	43·6	4·4
3	66·7	7·9

Spleen and liver enlargement is classified by age and sex, both conditions being most common in the 10 to 14 age-group but with little difference between the sexes.

It is concluded that there is a relationship between enlargement of the liver and infection with malaria, but owing to the frequency of liver enlargement in Taiwan, possibly due to other causes, it cannot be used as an index of malarial endemicity. [The association between enlargement of the two organs is clearly shown, though this connexion with malaria has been less firmly established, largely owing to the present fortunate rarity of parasites.] *G. Macdonald*

Gabaldon, A., Berti, A. L. & López, J. A. Importación de casos y erradicación de malaria: el problema en Venezuela. [**Importation of Cases and Eradication of Malaria. The Problem in Venezuela**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1956, Jan., v. 8, No. 1, 135–49, 2 figs. English summary.

The authors refer to their well-known work on malaria eradication in Venezuela and discuss the implications of the importation of malaria and how they should be interpreted. Occasional cases coming from neighbouring countries, and even farther afield, have been found.

The authors now describe in great detail 2 outbreaks in areas in Venezuela which had been free from malaria for 1 to 3 years. One was in the state of Monagas in 1953, was due to *Plasmodium falciparum* and was carried by *Anopheles darlingi*. The other was in the state of Sucre in 1955 and was due to *P. vivax* carried by *A. aquasalis*. The epidemiological features differed because of the different parasites and vectors: the authors also discuss differences found in age, sex, domicile and other environmental factors. The outbreaks had been imported from contiguous areas of Venezuela which were still infected.

Methods of control are discussed. The *P. falciparum* infections were quickly eliminated and have not recurred. The *P. vivax* outbreak was reduced at the time of writing (October 1955).

Spraying with insecticides should cover a large area in a short time at regular intervals, and the present outbreaks are attributed to failure to observe these rules. "A good epidemiological organization will help in discovering new cases but will not eliminate its occurrence."

H. J. O'D. Burke-Gaffney

Shute, P. G. & Maryon, M. **A Study on the Infectivity of Patients to Mosquitoes in the Early Stages of Primary** *Plasmodium vivax* **Malaria (Madagascar Strain).** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Sept., v. 51, No. 5, 403–10.

The authors first summarize this technique of malaria therapy with *Plasmodium vivax* (Madagascar strain) and *Anopheles maculipennis atroparvus*, in which 300 batches of mosquitoes have been infected since 1925 (120,000 mosquitoes and 9,900 patients). The highest microgametocyte density was found to occur between the 7th and 12th days in primary attacks and on the 1st and 2nd days of relapses. 54 patients were tested to see how soon they were infectious to mosquitoes after sporozoite induction. 100 mosquitoes were fed daily as soon as fever or parasites appeared, and these were dissected 7 days later for the detection of oöcysts. In 32 patients infection of the mosquitoes resulted before gametocytes were visible in the blood; the earliest infection occurred 2 days after the onset of fever or parasitaemia; from 22 patients mosquitoes became infected on the first day that microgametocytes were found.

The epidemiological significance of these results is discussed and it is suggested that gametocidal drugs should be given in malaria control schemes. *P. P. C. Garnham*

KALMIKOV, E. S. [**On the Genesis of Isolated** *Anopheles maculipennis* **Populations in the Taiga Belt of the European Part of the U.S.S.R.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1957, v. 26, No. 6, 717–21. [In Russian.]

The English summary appended to the paper is as follows:—

"New A. maculipennis colonies are permanently appearing, developing and disappearing in the taiga of the European part of the U.S.S.R., in its southern and central regions.

"Formation of new Anopheles colonies is of great practical importance. These colonies were formed in new settlements built in the region of Pocha river and its tributaries. As a result of arrival of people with malaria stable malarial foci were formed with high incidence of this disease; outbreaks of local malaria after arrival of individuals with malaria were likewise observed in certain other places. New malarial foci were found in places where new railways were built or lumber enterprises and others were organized in Taiga."

SUKHOMLINOVA, O. I. **Contribution to the Seasonal Biology of the Common Malaria Mosquito (*Anopheles maculipennis* Mg.) under the Conditions of the Province of Leningrad.** *Zool. Zh.* Moscow. 1956, v. 35, Pt. 3, 406–11, 2 graphs. [10 refs.] English summary Suppl. pp. 9–10. [Summary taken from *Rev. Applied Entom.* Ser. B. 1957, Dec., v. 45, Pt. 12, 212.]

Investigations were carried out in 1952–53 at Pavlovsk, in the province of Leningrad, on seasonal changes in the population of adult females of *Anopheles maculipennis* Mg., with a view to detecting their possible importance as vectors of malaria. It was established by examination of egg-batches in 1951 that *A. m. messeae* Flni. and *A. m. maculipennis* constituted 56 and 44 per cent. of the population, respectively. Females were collected in cattle sheds and uninhabited rooms and their physiological age determined by counting the dilations on the ovarioles, which indicate the numbers of times that oviposition has occurred. Fluctuations in 1952 in the numbers of females that had not yet oviposited and had done so once showed three peaks, on 17th June, 12th July and 12th August, thus indicating the development of three generations, and this was in agreement with counts of first-instar larvae in neighbouring breeding places. The over-wintered females were long-lived, surviving until

mid-June, and completed up to six gonotrophic cycles, but most of them died before malaria parasites could have completed development in them at the temperatures prevailing. First-generation females were present from early June until about the end of July and completed up to seven gonotrophic cycles in 1952 and 12 in 1953. Examples that could have become infective were present by 26th June and most numerous from 28th July to 10th August. Diapausing females were observed from mid-July.

Zanina, Z.L. [**Biological Characteristics of** *Anopheles superpictus* **Grassi in the Rushan District of Western Pamir**] *Med. Parasit. & Parasitic Dis.* Moscow. 1957, v. 26, No. 6, 721–32, 6 figs. [In Russian.]

The English summary appended to the paper is as follows:—

"A description is presented of the breeding places, and diurnal location of A. superpictus. The seasonal variations of the age composition of the population and the degree of contact with man were investigated in detail. The problems which characterize its epidemiological significance in western Pamir are presented (duration of sporogony, gonotrophic cycles, coefficient of survival and the percentage of epidemiologically dangerous females at different periods of the season).

"The data obtained indicate A. superpictus as the most important transmitter of tertian and tropical malaria in Rushan."

National Society of India for Malaria and Other Mosquito-Borne Diseases. **Vectors of Malaria in India.** 177 pp., 10 figs. & 7 maps. 1957. Delhi: 22, Alipore Road. [Rs. 3/–.]

Most of this review has already appeared in the *Bulletin of the National Society of India for Malaria and other Mosquito-Borne Diseases* and several of the 12 chapters have been noticed in the *Tropical Diseases Bulletin* [1954, v. 51, 249, *Anopheles philippinensis* and *A. minimus*; 761, *A. fluviatilis*; 1955, v. 52, 506, *A. stephensi*; 955, *A. varuna* and *A. leucosphyrus*; and 1957, v. 54, 1047, *A. culicifacies*].

The first chapter contains illustrated descriptions of the females of 10 species of *Anopheles* intended as aids to field workers in checking the identity of the vector species. The final chapter gives details of the dissections of 29 other Indian species.

About 20 species of *Anopheles* have been found infected with the plasmodia of malaria in India but only 6 are of first importance as vectors, namely, *A. culicifacies*, *A. fluviatilis*, *A. minimus*, *A. philippinensis*, *A. stephensi* and *A. sundaicus*; these and 4 others, *A. annularis*, *A. jeyporensis* v. *candidiensis*, *A. leucosphyrus* and *A. varuna*, are here considered separately by different authors in as many chapters in the

main part of the book. In general, these 10 chapters give summaries of published information and follow much the same pattern, dealing with distribution, breeding places, adult haunts, habits, relation to malaria and control.

The chapter on *A. culicifacies* is fuller than the others and occupies some 30 pages; the others vary in length from 8 to 15 pages. There is, of course, still much to learn and the editor has inserted some notes which help to fill in a few gaps. Naturally, many remain, some of which are indicated by the authors; for instance data are still needed in several species on longevity, outdoor resting and feeding habits, flight range and gonotrophic cycle, and more accurate knowledge is still required about some species which appear to have more than one form.

Watch has to be kept for evidence of physiological or behaviouristic changes which might indicate a reduction in susceptibility of the mosquitoes to the effects of the modern insecticides. Such evidence might mean the appearance of resistant strains such as have been recorded in Java among *A. sundaicus* [*ibid.*, 1955, v. 52, 329] and locally in Southern India among larvae of *A. stephensi* [*ibid.*, 1957, v. 54, 126].

The summaries are well provided with references to the appropriate literature and have been compiled and presented in a form useful to malariologists and entomologists in the field as well as to teachers and students.

In addition it is hoped that these accounts will, by indicating the gaps in our knowledge, stimulate further research resulting in the planning of control measures which will be assured of increased effectiveness.

H. S. Leeson

Omardeen, T. A., Kellett, F. R. S. & Gillette, H. P. S. **Precipitin Studies on *Anopheles aquasalis* Curry, the Coastal Vector of Malaria in Trinidad, B.W.I.** *West Indian Med. J.* 1957, Sept., v. 6, No. 3, 205–14, 4 figs.

Since 1950 catches have been made of *Anopheles aquasalis* at Laventille and New La Paille, near Port-of-Spain in Trinidad, in their outdoor resting places (grasses up to 24 inches tall) in order to determine by precipitin test the source of their blood meals. Laventille, a built-up suburb of Port-of-Spain, had been sprayed with DDT indoors since 1947; trap catches out of doors still number 12,880 *A. aquasalis* per year (1955). New La Paille is an agricultural village, untreated with residual DDT and the outdoor trap catches are 140,126 *A. aquasalis* or more. Tables give the numbers of domestic animals and human beings in these areas from 1950 to 1955 and the distribution of choice of host by *A. aquasalis* between the different animals and man. (Evidence of two to four different hosts are recorded for numerous individual mosquitoes.) There is a notable similarity in the feeding habits of the mosquitoes of each area despite the

DDT-factor; the ratios of man to other animals were between 22 to 1 and 42 to 1 for Laventille and between 4 to 1 and 7 to 1 for New La Paille; the percentages of ox feeds were over 63% at both places, feeds on man 6% or under, and percentages feeding on equines, goat and sheep, pig, or dog were 8% or less, equines being favoured after the predominantly attractive cattle. Just under 10% of bloods were not determined; they may be of wild animals or mangrove birds. The results are based on substantial numbers of specimens (4,590 females for Laventille and 13,329 for New La Paille) and the precipitin tests were done by Mr. B. Weitz at the Lister Institute in England.

D. S. Bertram

Robertson, G. I. **Experiments with Antimalarial Drugs in Man. V. Experiments with an Active Metabolite of Proguanil and an Active Metabolite of 5943.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Nov., v. 51, No. 6, 488–92.

The synthesis of a metabolite of proguanil more active than the parent and a similar substance from compound 5943, which has one Cl atom more than proguanil, have been described [this *Bulletin*, 1952, v. 49, 362; 1953, v. 50, 485]. The method by which these substances are formed through loss of two hydrogen atoms followed by ring closure is shown diagrammatically. Because of the greater activity of these metabolites than of the parent compounds in *P. gallinaceum* infections, it was deemed desirable to give them a clinical trial. African volunteers were used and exposed to infection as described by Davey and Robertson [*ibid.*, 1958, v. 55, 127].

It was found that the metabolite of 5943 was active against early exo-erythrocytic and erythrocytic stages of *P. falciparum* and the drug prevented development of this parasite in the mosquito. It also caused the blood forms of *P. vivax* and *P. malariae* to disappear. Its antimalarial action was less persistent than that of proguanil and it appeared to be rapidly metabolized or excreted. The results proved relatively disappointing to the authors.

A limited number of experiments on the metabolite of proguanil itself were carried out on the same lines. While it was concluded that these metabolites are active antimalarials and act like the parent compounds qualitatively, they are nevertheless rapidly excreted or destroyed and are therefore less suitable than the parent substances in treatment of malaria.

J. D. Fulton

i. Morones Prieto, I. Avances en la lucha antipaludica. [**Advances in the Control of Malaria**] *CNEP Bol.* Mexico. 1957, Jan.–Mar., v. 1, No. 1, 7–16, 6 figs. & 1 chart. English summary.

ii. Romero Alvarez, H. Informe sobre las tecnicas y metodos empleados en el programa de Erradicación del Paludismo en México. Descripción de las Operaciones de Rociado. [**Technique and Methods employed in the Programme of Malaria Control in Mexico. Description of Spraying Operations**] *CNEP Bol.* Mexico. 1957, Apr.–June, v. 1, No. 2, 1–11, 3 figs., 2 maps & 2 charts. English summary.

i. This paper describes the work undertaken by the National Committee for the Eradication of Malaria (in Mexico) during 1956 [this *Bulletin*, 1957, v. 54, 1157]. The epidemiological section surveyed the malarial areas and studied transmission and distribution. More than 3 million houses were surveyed and towards the end of the year preliminary spraying was begun in the 14 malarious zones of the country, as a pilot survey for the " total coverage " which began early in 1957.

Training and health education were carried out and these, together with the administrative organization, are described. Research was carried out on insecticides, the behaviour of Mexican anophelines and antimalarial drugs. The paper is illustrated with 6 photographs and one figure.

ii. The technical organization of the control of malaria in Mexico is described and special reference is made to the part played by sanitary engineers. The four stages of spraying operations are described and the paper is illustrated with 3 photographs, 2 maps and 3 figures, which indicate the areas of operation, the organization of sectors and their types.

H. J. O'D. Burke-Gaffney

Hawking, F., Mellanby, Helen, Terry, R. J. & Webber, Winfrith A. F. **Transmission of** *Plasmodium knowlesi* **by** *Anopheles stephensi*. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Sept., v. 51, No. 5, 397–402, 1 fig. [10 refs.]

The authors describe two successful series of experiments in the mosquito transmission of *Plasmodium knowlesi*. The first was with the Nuri strain, the second with a more recent strain isolated from a *Macaca irus* sent from Malaya in 1956. Both strains were highly virulent and typical of the species in all respects. Success was thought to be due in part to the use of recently isolated strains, but other factors were concerned, because infection of the mosquitoes did not invariably occur. *Anopheles stephensi* and *A. maculipennis atroparvus* were used; the mosquitoes and the monkeys were given para-aminobenzoic acid and vitamins of the B group, in an attempt to make the environment more suitable for the sporogony of the parasite, though no evidence that this actually occurred was obtained. Many of the batches of mosquitoes became infected and showed numerous oöcysts on the mid-gut, but sporozoites in the salivary glands were always scanty, and transmission of the infection had to be done by the inoculation of both the oöcysts and glands. In this way, 5 successful transmissions occurred in the first

series of experiments and one in the second, with pre-patent periods varying from 6–8 days to 11 days. Biopsies of the livers of the monkeys were taken at different intervals, but neither pre- nor exo-erythrocytic schizonts were found (except in one instance where a mixed infection with *P. cynomolgi* was present and 5-day pre-erythrocytic schizonts of this species were detected). *P. C. C. Garnham*

Ray, A. P. **Studies on Nuri Strain of *P. knowlesi*. Part XIV. Pathological Processes in the Liver.** *Indian J. Malariology*. 1957, June, v. 11, No. 2, 239–46, 5 figs. on 2 pls. [22 refs.]

The progress of liver changes was examined in 50 *M. mulatta* monkeys infected intravenously with a standard dose of 5 million *Plasmodium knowlesi* (Nuri) per kgm. body weight. Biopsy material was studied in 5 animals with infection rates of 0·3 to 10%, in 9 with rates of 28 to 53% and in 20 either just before or after death, with rates of 57 to 96%. Liver tissue was fixed in formol and either stained with haematoxylin and eosin or as frozen sections with Sudan III. Normal biopsy tissue from 29 animals was examined.

Some swelling of polygonal cells was noted in the early cases, but the lobular structure was undisturbed. Three of the middle group showed centrilobular necrosis with dilated central veins and sinusoids. The latter were filled with parasitized and unparasitized erythrocytes, swollen Kupffer cells, white blood cells, etc. All the animals in the terminal group showed centrilobular or more extensive changes including necrosis and fatty infiltration which sometimes involved the peripheral cells. The central veins were sometimes difficult to identify, but were usually grossly dilated. The sinusoids in the central region of the lobules were dilated and packed as in the earlier cases.

The author discusses the possible mechanics of the development of the lobular necrosis and concludes that there are serious objections to the theory that sinusoidal blockage is the significant factor. He favours the idea of active hepatic venous constriction, as postulated by the abstracter [this *Bulletin*, 1949, v. 46, 180], and suggests that since necrosis is not a constant feature until the infection rate reaches about 60%, and since the necrosis can be prevented to some extent by blood transfusions (Ray, 1955, Ph.D. Thesis, Patna), anoxia may be the stimulant for the constrictor effect. *B. G. Maegraith*

Sergent, Ed. & Poncet, Alice. L'ingestion de *Plasmodium berghei* peut contaminer. [**Ingestion of *Plasmodium berghei* can cause Infection**] *Arch. Inst. Pasteur d'Algérie*. 1957, Sept., v. 35, No. 3, 201–2.

The following is a translation of the authors' summary:—

Of 3 white rats fed in the same way on the viscera and muscles of white mice infected with *P. berghei*, one became infected.

H. J. O'D. Burke-Gaffney

Sergent, Ed. & Poncet, Alice. Résistance innée du hérisson au paludisme des rongeurs à *Plasmodium berghei*. [**Innate Resistance of the Hedgehog to Rodent Malaria caused by** *Plasmodium berghei*] *Arch. Inst. Pasteur d'Algérie.* 1957, Sept., v. 35, No. 3, 203.

Ramakrishnan, S. P., Satya Prakash & Choudhury, D. S. **Studies on** *Plasmodium berghei* **Vincke and Lips, 1948. XXIV. Selection of a Chloroquine Resistant Strain.** *Indian J. Malariology.* 1957, June, v. 11, No. 2, 213–20. [12 refs.]

Failure to produce resistance to chloroquine (Resochin) in a number of different plasmodia has been recorded [this *Bulletin*, 1949, v. 46, 446, 709; 1950, v. 47, 1057; 1952, v. 49, 673; 1957, v. 54, 794]. The authors have now used methods similar to those employed in selecting a sulphadiazine-resistant strain. Albino mice were given 5×10^6 parasites intraperitoneally. Drug was given parentally once daily in doses of 2·5 mgm./kgm. at the start. This amount is about one-tenth the oral dose required to cause disappearance of the parasites for a few days. During a period of 7 months 33 passages were made, treatment being given sometimes more than once to the same host. The degree of parasite resistance attained was finally 150 to 200-fold. It is not clear whether the reactions of *P. berghei* differ from those of other plasmodia or whether the metabolism of the drug in the mouse varies from that in other hosts.

J. D. Fulton

Satya Prakash. **Studies on** *Plasmodium berghei* **Vincke and Lips, 1948. XXV. The Role of Casein Diet on the Acquired Immunity of Mice Infected with** *P. berghei*. *Indian J. Malariology.* 1957, June, v. 11, No. 2, 221–9.

Ramakrishnan *et al.* [this *Bulletin*, 1955, v. 52, 253] came to the conclusion that in *P. berghei* in mice, a balanced lacto-vegetarian diet favoured development of immunity in the host. The effect of casein in production of immunity has now been studied. 78 mice were used in 3 experiments. Three different diets were used including one with a high proportion of casein, one without casein and a third with a certain proportion of milk. The exact composition of each is given in a table. Each diet was given for 4 weeks before inoculation with 1 million parasites. The course of infection was followed in stained films. The variation in host weight during infection was approximately the same with the three diets. The casein diet favoured parasite growth as well as host tolerance. In spite of the higher daily and peak parasitaemia in the casein-fed group the host survival period in their case was not shorter than in other groups. This suggested that a greater degree of immunity developed and the view was supported by the greater increase in spleen size. *J. D. Fulton*

Trager, W. **The Nutrition of an Intracellular Parasite (Avian Malaria).** *Acta Tropica.* Basle. 1957, v. 14, No. 4, 289–301, 1 coloured fig. on pl. [Numerous refs.]

The study of the nutrition of an intracellular parasite such as that of malaria has been hampered by ignorance of the part which the host cell plays in the association. The problem has therefore been approached by short-term studies on isolated parasites or by experiments on growth and multiplication *in vitro* in absence of the host cell. The author in earlier experiments [this *Bulletin*, 1948, v. 45, 159; 1950, v. 47, 816; 1953, v. 50, 195; 1955, v. 52, 255] has used *P. lophurae* for these studies, a parasite which gives rise to heavy infections in ducks or chickens. Details of the methods for freeing parasites from red cells and preparing media are given in the references cited. The culture flasks maintained at 40 to 40·5°C. were rocked 16 times per minute while moist air containing 5% CO_2 passed through them, and the medium was replaced at intervals. The survival and development of parasites were followed in wet preparations with the aid of phase-contrast microscopy as well as in stained films. The value of the different components added to the culture medium is discussed.

It was found that *P. lophurae* free from the host red cell survived and developed *in vitro* for 4 days. Among the substances supplied by the medium, glucose, pyruvate, malate, cozymase, diphosphopyridine nucleotide and coenzyme A, are of importance as well as other unknown materials in the red cell extract. It is also possible that the parasite when first isolated contains some necessary factor which is gradually utilized. The need of the parasite for some coenzymes found within non-infected erythrocytes provides at least a partial explanation of its obligate intracellular character. This probable dependence on host-cell enzymes receives further support from the fact that *P. lophurae* requires materials from the host cell which are not dialysable but are yet distinct from haemoglobin. *J. D. Fulton*

Stohler, H. Analyse des Infektions verlaufes von *Plasmodium gallinaceum* im Darme von *Aedes aegypti*. [**Course of Infection of** *Plasmodium gallinaceum* **in the Gut of** *Aëdes aegypti*] *Acta Tropica.* Basle. 1957, v. 14, No. 4, 302–52, 26 figs. [Numerous refs.]

This thorough study is much concerned first with the nature of the peritrophic membrane in *Aëdes aegypti* and includes observations on its structure as observed with an electron microscope. The membrane, as previously observed, is a protein-chitin secretion of the mid-gut epithelium, and encloses the blood meal [this *Bulletin*, 1954, v. 51, 739]; it is ultimately discharged with the residue of digested blood in the faeces. A fresh membrane is secreted round each blood meal which may be taken. It is shown that oökinetes can pass through the peritrophic membrane.

and at any point of it, during the first 30 hours of its formation. After that the membrane is too well formed and firm for penetration. Oökinetes which have got into the space between the membrane and the gut wall penetrate through to the basement membrane of the gut intercellularly. These events are illustrated by a series of photographs and a diagram. There is some evidence that reduction division takes place in the first nuclear division of the young oöcyst, so that the haploid phase would exist from this point, through the mammal infection, until fusion of the gametes in the stomach of the subsequent vector. The significance of the peritrophic membrane in controlling the further development of oökinetes of other plasmodia in their particular vectors is suggested as an interesting field for investigation. *D. S. Bertram*

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:*—*epidemiology, actiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

Scott, D. **The Epidemiology of Human Trypanosomiasis in Ashanti, Ghana (Gold Coast).** *J. Trop. Med. & Hyg.* 1957, Sept., Oct., Nov. & Dec., v. 60, Nos. 9, 10, 11 & 12, 205–15; 238–49; 257–74; 302–15, 10 maps, 20 pls., 3 diagrams, 1 plan & 1 graph. [Numerous refs.]

Ashanti (24,000 square miles, 900,000 population) can be divided into two parts, a north-east area of woodland savannah and a south-west forest area. Two large parts of the savannah are uninhabited. Before the 1920's trypanosomiasis in Ghana was almost confined to a low endemic level in Ashanti. Then the epidemic broke out in two large areas of the Northern Territories. In Ashanti the disease increased correspondingly, mainly near the main roads along which pass thousands of foot travellers, coming from or through epidemic northern areas and often therefore themselves infected and infectious.

As the northen epidemic was brought under control, incidence in forest zones dropped spontaneously, but a low endemic level persists intractably along main roads. There are, too, a few villages in which transmission appears to be unusually free, where fresh infections can always be found a few months after local mass survey and treatment. The method of survey and treatment is considered to be the best for control in the forest: clearing of vegetation may actually facilitate transmission by giving the fly better sight-hunting, and mass chemoprophylaxis is not

applicable to a population with a large migrant element. It might be expected that where trypanosomiasis is transmitted only with difficulty, once a sufficiently low rate had been established the disease would die out. Repeated mass survey and treatment, however, does not appear to eradicate trypanosomiasis, which continues steadily even at infection rates of less than 1 in 1,000. One explanation of this could be the existence of a reservoir of infection in lower animals, or alternatively, continual re-introduction from outside by infected migrants.

Immigrant farm labourers from the north are still the most heavily infected section of the community, acquiring their infections after arrival in Ashanti while working on farms, where evidence indicates that transmission principally takes place. Infection rates in northern labourers entering and leaving Ashanti, 1952–54, were respectively 0·14% and 0·86%. Owing to their occupational risk of infection in Ashanti, these northerners are a source of danger when they go home; the position has in fact been exactly reversed since the time when infected immigrants stoked the low forest endemicity. Immigrant labourers with 1–10 years' residence in Ashanti have an infection rate of 1·44%, compared with the local male Ashantis' rate of 0·18%. It is concluded that, for the purpose of control by mass treatment, the greatest number of cases can be found in the shortest possible time by examining males of northern origin in villages on main roads. More than half the cases occur in this 20% of the population.

There is no relation between trypanosomiasis incidence and the main river systems, or cattle routes, or season in Ashanti.

[The trypanosomiasis pandemic of the West African savannah has received very full attention in the literature. Nowadays, however, perhaps the greatest problem presented by West African trypanosomiasis lies in the existence of intractable foci in the forest country bordering the savannah. The value of this paper is that it records an intimate epidemiological study of forest trypanosomiasis, the result of some years of systematic investigation. It is presented with much relevant statistical detail which can scarcely be indicated in this summary.]

B. B. Waddy

Weinman, D. **Cultivation of Trypanosomes.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Nov., v. 51, No. 6, 560–61.

The author has previously described his successful techniques for the cultivation of *T. rhodesiense* and *T. gambiense* [this *Bulletin*, 1955, v. 52, 692] from the blood and cerebrospinal fluid of sleeping sickness patients. By this means the presence of trypanosomes was sometimes detected in the absence of other proofs of infection. In one group of 30 patients in whom no infection was detectable by other means, 14% were found to be positive on culture. In another series of approximately the

same number of patients known to harbour *T. gambiense* about 75% were found positive in the first culture. The failure of growth in others was ascribed to the presence of contaminating bacteria. The use of penicillin and dihydrostreptomycin in these circumstances has now given promising results. It is well known that culture forms of African trypanosomes are not infective to animal hosts. On two occasions infectivity for mice was restored to cultures of *T. rhodesiense* maintained for 51 and 69 days respectively *in vitro* by the addition of the non-reducing sugar trehalose $C_{12}H_{22}O_{11}$, which yields glucose on hydrolysis. Control cultures remained non-infective. The author is careful to point out that an impurity present or some metabolic product of this sugar may be responsible for the result obtained. *J. D. Fulton*

Collomb, H. & Miletto, G. Les séquelles de la trypanosomiase humaine africaine. [**The Sequelae of Trypanosomiasis in Africa**] *Bull. Soc. Path. Exot.* 1957, July–Aug., v. 50, No. 4, 573–85.

"Sequel" means the residual or permanent after-effect of a cured disease. "Cure", of trypanosomiasis, is difficult to define and might be held to mean parasitic sterilization; but some patients seem to be cured when there is merely a state of equilibrium between the host and the parasite—a state of premunition. In some cases in which the parasite has been eradicated, manifestations of the disease, such as nephritis, hepatitis and other lesions, continue to develop; in these cases the word "cure" obviously is inapplicable. In actual practice a "sequel" may be considered to be a lesion causing clinical signs, and due to some permanent and irreversible anatomical damage caused by the disease. In fact in African sleeping sickness the term sequel is never used; this may be because there are no satisfactory criteria of "cure" or, alternatively, there are indeed no sequelae, the disease in all cases either being "cured" or proceeding to a fatal issue. Every year hundreds of Africans are declared "cured" of their trypanosomiasis, but there is much doubt as to whether they are really cured. The long clinical and parasitic latency of the disease indicates the caution which should be exercised in claiming cure. In practice prolonged regular supervision and repeated re-examination are necessary before cure can truly be claimed. In some old treated cases of trypanosomiasis the patients continue to show psychic, neurological and endocrine abnormalities; it is with these that the authors are concerned.

Electro-encephalographic studies of some cured patients showed permanent changes in the tracings; most of the patients claimed as cured, but who have suffered from severe meningo-encephalitic seizures, have subcortical cerebral atrophies demonstrable by air-encephalography by the lumbar route. Sequelae falling into these 3 categories—psychic, neuro-endocrinal, and neurological—are evident in some detailed illustrative case

histories which are set out at some length. These records and the conclusions to be drawn from them should be consulted in the original text by those interested.

[See also this *Bulletin*, 1957, v. 54, 931; 1958, v. 55, 133, 259.]

A. R. D. Adams

Lacombe, D. Estudos anatômicos e histológicos sôbre a subfamília Triatominae (Heteroptera, Reduviidae). VII. Estudo anatômico do ducto intestinal do *Triatoma infestans*. [**Anatomical and Histological Studies on the Sub-Family Triatominae. VII. Anatomical Study of the Intestinal Tract of** *Triatoma infestans*] *Mem. Inst. Oswaldo Cruz*. 1957, v. 55, No. 1, 69–111, 51 figs. [24 refs.] German summary.

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

Doury, P. Trois nouveaux cas autochtones de leishmaniose générale (kala-azar méditerranéen) observés au Hoggar (Sahara central). [**Three New Cases of General Leishmaniasis (Mediterranean Kala Azar) of Local Origin seen in the Hoggar Area (Central Sahara)**] *Arch. Inst. Pasteur d'Algérie*. 1957, Sept., v. 35, No. 3, 204–11.

See this *Bulletin*, 1957, v. 54, 549.

André, R., Brumpt, L., Dreyfus, B., Passelecq, A. & Jacob, S. Leishmaniose cutanée, leishmaniose cutanée-ganglionnaire et kala-azar transfusionnel. [**Cutaneous Leishmaniasis, Cutaneous-Glandular Leishmaniasis and Transfusional Kala Azar**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1957, Nos. 25/26, 854–60, 4 figs. [13 refs.]

This most interesting paper is founded upon two cases of leishmaniasis which have been carefully studied. One could be classified as cutaneous-glandular and the other as purely cutaneous. The first appeared after a holiday in Spain, the second was contracted in the French Midi and both are attributable to *Leishmania infantum*. The transfusion of blood from the first of these subjects, who acted as a donor, produced typical visceral leishmaniasis (kala azar) in the recipient.

The first patient was 44 years of age and a voluntary blood donor belonging to O Rh-negative blood group. In 1955 his blood was examined and gave a red cell count of 4,150,000 per cmm. with 5,600 leucocytes. In November of the same year during a medical examination a number

(14 in all) of small disseminated papules, each the size of a millet seed, were discovered on the forearm, abdomen and legs. These were pink in colour, covered with glossy epithelium, and painless. The patient attributed them to mosquito bites resulting from a camping expedition in July 1955 to the North of Spain and the French Midi. Those over the forearm, he explained, were at first pruriginous, but afterwards they became firmer and settled down; the others developed on his return to Paris at the beginning of August 1955. Although his physical condition was excellent, a minute examination disclosed a nest of hard indurated glands in the carotid region, the size of small hazel nuts. Aspiration of these revealed a low-grade cellular exudate while individual leishmaniae were present in the reticular cells and in one mass over 1,000 individuals were demonstrated. Thereafter the cutaneous papules on the forearm were examined and leishmaniae also demonstrated. The myelogram was normal and sternal puncture negative. The red cells were unaffected, but the leucocytes numbered 4,700 per cmm. with 45% of polymorphs. Paper electrophoresis of the serum was normal with no increase of gamma globulins, but gelification was complete with the formol-gel test. With intravenous injections of glucantime, 3 gm. daily for 10 days, the cutaneous papules rapidly disappeared. One month later a second similar series of injections was administered. In July 1956 this donor was reviewed when his blood count was improved, the sedimentation rate was normal and the formol-gel test negative.

The second observation concerned a lady, Madam D, who had spent her holidays in company with the family of the first patient. She had no complaints, but a systematic examination disclosed the existence of papules on the left forearm similar to those already described and in a scraping of the lesions leishmaniae were seen. Although her blood count was more or less normal there was a slight increase of gamma globulins shown by electrophoresis of the serum. She had no treatment and the leishmania papules disappeared of their own accord, leaving a minimal cicatrix in their wake.

The third observation now enters its most interesting stage and would not have been possible if the first patient had not decided to give his blood to two exsanguinated new-born infants in September 1955, one month before the incidents already recorded. The first child received 250 ml. of the donor's blood. It was followed up and found to be normal. Eight months after the transfusion it was learned that the second child was in hospital under the care of a colleague. The immediate results of the blood transfusion had been satisfactory, but at the beginning of November 1955 the child, who had received 250 ml. of the blood, had been admitted with a severe anaemia with 3,000,000 red corpuscles per cmm. and further transfusions were necessary. From that time onwards the child developed a new syndrome, culminating in June 1956. Then there were severe anaemia with high fever and distended abdomen with hepatomegaly and splenomegaly. The red cells numbered 2,600,000 and

the leucocytes 11,600 per cmm. Leishmaniae were demonstrated on several occasions by sternal puncture and also, it must be stressed, in blood films. The formol-gel test was positive within 5 minutes while paper electrophoresis showed a definite augmentation of the gamma globulins. The sedimentation rate was greatly increased. This child with kala azar was treated by 30 ml. transfusions every second day for one month and by injection of glucantime, 1·5 gm. daily for 15 days, with excellent results.

The question immediately arises as to how this series of events should be viewed. The cutaneous lesions must be classified as cutaneo-glandular leishmaniasis which on transfusion was converted into visceral leishmaniasis. It is well known that *L. tropica*, given intravenously to white mice, produces a visceral infection. Against this it must be remarked that the glandular lesions (carotid region) were found in an area devoid of cutaneous lesions. We also know well that parasitaemia in carriers of *L. tropica* has not so far been demonstrated. Also it must be remembered that regions of northern Spain and central France have been found to harbour endemic foci of *L. infantum* infection transmitted by *Phlebotomus perniciosus*, while oriental sore carried by *P. papatasi* does not exist.

Petrov in Uzbekistan [this *Bulletin*, 1938, v. 35, 134], Kirk in the Sudan [*ibid.*, 1938, v. 35, 866] and P. E. C. Manson-Bahr in Kenya [*ibid.*, 1955, v. 52, 522] have demonstrated what can be regarded as a primary sore of kala azar which is analogous to an inoculation chancre, like that of trypanosomiasis. Possibly this was the case with Madame D in whom the sores receded spontaneously, as in the kala azar lesion, whereas *L. tropica* sores invariably leave a ragged scar.

An analogous case has been reported from Barcelona by Rosique Cebrian and Vargas Pesado (1920) (Résumé in *Bull. Office Internat. Hyg. Pub.*, 1921, v. 13, 637). In this instance a girl developed a leishmanial sore on her cheek which healed without scarring. A dog inoculated with a serous extract of the sore was found to have leishmaniae in the spleen, some 45 days afterwards.

The authors remark that these minimal lesions suffice to produce an immunity, so that it is possible that many similar instances to the story recorded here have been overlooked. *Philip Manson-Bahr*

Lippi, M. La leishmaniosi viscerale e cutanea in Italia. [**Visceral and Cutaneous Leishmaniasis in Italy**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1957, Oct., v. 38, No. 10, 503–27, 6 graphs & 5 maps.

The author from the Tropical Diseases Clinic of the University of Rome gives an account of the extent and distribution of both visceral and cutaneous leishmaniasis in Italy from 1930 to 1954. The visceral form was made compulsorily notifiable in 1927, and the cutaneous form was included in 1940, but compulsory notification of each separately did not

begin till 1946. Hence accurate details of the cutaneous disease only date from then. Numerous figures and some graphs are given relating to location, age, sex, and season of the year, for both forms, which can be summarized as follows.

Visceral leishmaniasis is most common in southern Italy and the islands, *i.e.*, Calabria, Sicily and Sardinia, though occasional cases are found as far north as Lombardy. From 1930 notifications oscillated round a figure of 200 per annum with a rise in 1938 to over 300. After the war there has been a reduction from 583 cases in 1946 to a figure of some 50 cases from 1950 onwards. Infants and young children aged 0–9 are by far the most often affected. The period of greatest incidence is in May, but the other months' figures only differ slightly from each other.

Cutaneous leishmaniasis shows some distinct differences from the visceral disease. It is most common in the Adriatic coastal region, especially in the Abruzzo-Molise region. It is most frequent in winter and spring, the hot months showing a much lower incidence. The main age-incidence is from 5 to 25, even the 60+ group showing a higher incidence than any of the 0–5 groups. The notifications have fallen from a peak of 2,742 in 1947 to round about 500 in 1954.

The author points out that the Communes chiefly affected are along the coast and the banks of the rivers and usually below a height of 600 metres. He considers the post-war reduction in both sets of figures to be due to the use of DDT and other insecticides. He gives a considerable list of *Phlebotomus* spp. found in Italy. *W. K. Dunscombe*

McMillan, B. **An Unusual Case of Cutaneous Leishmaniasis diagnosed in Kano, Northern Nigeria.** *West African Med. J.* 1957, Dec., v. 6 (n.s.), No. 4, 190–91. [10 refs.]

"(1) The history of a male European case of cutaneous leishmaniasis, diagnosed in Kano, Northern Nigeria, is outlined.

"(2) It is thought likely that the infection occurred in the territory of Kuwait on the Persian Gulf and the incubation period was between 17 and 29 months.

"(3) Mention is made of the obscure epidemiology of this disease in both areas.

"(4) The danger of the introduction of such cases into an area of apparent low endemicity is discussed."

Woo, Z. P. & Reimann, H. A. **Cutaneous Leishmaniasis—Confusion with Histoplasmosis. Report of a Case.** *J. Amer. Med. Ass.* 1957, July 6, v. 164, No. 10, 1092–3, 1 fig. [10 refs.]

A small pimple which in 3 months' time developed into a nodule 1 cm. in diameter and raised 0·5 cm. from the surface, occurred on the chin of a healthy 14-year-old girl who had come to the United States from Italy

a year before. "It was red, shiny, and surrounded by a narrow red areola. It was not tender and did not itch, but it was excised for cosmetic reason. . . ." A haematoxylin-eosin section showed "a dermal papule with superficial ulceration at the top surrounded by local pseudo-epitheliomatous hyperplasia. The dermis was thickened with proliferating histiocytes, arranged in anastomosing cords, and tuberculoid granulomas, with a few giant cells. The stroma was filled with lymphocytes and plasma cells". Oval bodies that were at first thought to be histoplasms, but were later clearly identified as leishmaniae, were seen in the histiocytes.

On examination at a later date [interval not stated] there was only a 2·5 cm. scar on the girl's chin. Serological tests for histoplasmosis were negative. [It would have been of interest if the part of Italy from which the girl had come had been stated; oriental sore is by no means widespread in Italy. On the other hand there are many endemic foci of kala azar. The clinical description of the lesion would not exclude post-kala-azar dermal leishmaniasis, though the areola around the base of the papule is against it. The visceral infection might have been sub-clinical. The ulcerated apex of the nodule also suggests that it was an oriental sore, but it is a pity that it was not possible to isolate the micro-organism. While 4 months is about the average incubation period of oriental sore, a year is quite usual; that of post-kala-azar dermal leishmaniasis is seldom under a year.] *L. E. Napier*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

Kostrzewski, J. **Investigations on the Epidemiology of Typhus Recrudescences in Poland.** *J. Hyg. Epidemiol., Microbiol. & Immunol.* Prague. 1957, v. 1, No. 3, 237–44, 4 figs. [15 refs.]

Zinsser's hypothesis (1934) [this *Bulletin*, 1935, v. 32, 154] that recrudescences of typhus are the result of the survival of the causative organisms in persons who have had the disease and acquired a temporary immunity which, in certain circumstances, breaks down, has received further support from work which has been published [*ibid.*, 1956, v. 53, 1414; 1957, v. 54, 551, 801].

Investigations of the incidence of typhus in certain countries have suggested that there might be a particular periodicity in the recrudescences of typhus. The present paper describes a statistical analysis of this point based on the numbers of recrudescences in Poland (462 cases in 1952–55) and figures collected from the world literature. Methods used for collecting data on these cases and the number of years in the interval between

the first attack and recrudescence are described with a statement of the normal logarithmic distribution curve used in the statistical analysis. The results of the analysis are fully described and discussed. It was found that " In the first years after the illness, the number of recrudescences is small, but a very distinct rise can be observed after a lapse of 10–15 years ". Theoretical calculations suggested that during 1952–55 the number of recrudescences in Poland should rise and actually the number of such cases were 7 in 1952, 35 in 1953, 51 in 1954 and 61 in 1955. In 1953–55, sporadic cases formed 95% of all the cases of typhus notified and they occurred throughout each whole year and there was no " characteristic intensification " of their incidence during winter and spring. *M. E. Delafield*

Bovarnick, Marianna R. & Allen, Emma G. **Reversible Inactivation of the Toxicity and Hemolytic Activity of Typhus Rickettsiae by Starvation.** *J. Bacteriology.* 1957, Nov., v. 74, No. 5, 637–45. [13 refs.]

" Typhus rickettsiae incubated for several hours at 36 C in the absence of substrate lose hemolytic activity and toxicity. The loss can be prevented by addition of glutamate, pyruvate, or adenosine triphosphate (ATP). Subsequent incubation of the starved organisms with glutamate at 30 C leads to partial or complete recovery of toxicity and hemolytic activity. No other substance can substitute for glutamate in bringing about recovery, although ATP or adenylic acid, added with glutamate, can sometimes increase the extent of recovery.

" Analysis of the ATP content of the rickettsiae during the starvation and recovery process indicates that the ATP level falls to zero during starvation and rises again on addition of glutamate. Anything that diminishes the final ATP level also inhibits recovery. However, when glutamate is added at 35 C instead of at 30 C, the rickettsiae show much less recovery of toxicity and of hemolytic activity, although they are capable of even more active oxygen uptake and phosphorylation. It appears therefore that some process in addition to phosphorylation is required for recovery."

[See this *Bulletin*, 1957, v. 54, 940.]

Vermeil, C., Chene, R. & Zaibi, A. Virus typhique murin et surveillance murine à Tunis. [**Rat Surveys and Murine Typhus in Tunis**] *Arch. Inst. Pasteur de Tunis.* 1957, Dec., v. 34, No. 4, 531–5.

Between February and November 1957, the authors examined 370 *Rattus norvegicus* taken in the neighbourhood of the port in Tunis. The brains of these rats were emulsified in saline in lots of 10, and 3 ml. of each lot were inoculated intraperitoneally into 2 guineapigs, which were followed up for 20 days. 16 of the guineapigs (on 3 occasions, both

animals from the same lot) developed a scrotal reaction and fever within 10–12 days.

Experiments are described in detail in which the aetiology of this syndrome was studied in 3 ways.

(1) Emulsions of brain and tunica vaginalis from animals showing the syndrome were inoculated into fresh guineapigs, which developed the syndrome, but were bacteriologically negative. Emulsions of tunica vaginalis from one of these instilled intranasally into mice produced consolidation of the lungs and smears of the lungs showed rickettsiae. Similar emulsions given intraperitoneally into white rats and passaged therefrom to guineapigs by means of brain and spleen emulsions rapidly reproduced the syndrome. Further tests with rats and guineapigs showed that emulsions of tunica vaginalis produced the syndrome more rapidly than did brain emulsions.

(2) Cross-immunity tests in rats and guineapigs between this strain, the strain of *R. mooseri* isolated in Tunis by Nicolle and Sparrow [this *Bulletin*, 1934, v. 31, 627; 1935, v. 32, 158] and Giroud's Bangui strain showed that cross-protection was produced.

(3) Microagglutination tests in the sera of 5 guineapigs which had developed orchitis after inoculation with tissue emulsions of the Tunis rats gave titres of 1 in 160 to 1 in 640 with epidemic typhus antigen and up to 1 in 1280 (the highest tested) with murine typhus antigen. Similar results were obtained with the sera of the test animals described above.

The authors conclude that murine typhus is enzootic to a considerable extent in the rats in Tunis. Evidence of this was found in rats taken in every month, except July. *H. J. O'D. Burke-Gaffney*

Sasa, M., Ueno, Y., Miura, A. & Tanaka, H. **Notes on the Bionomics of *Neoschöngastia* spp. and *Trombicula hasegawai*, the Summer-Tsutsugamushi at Hachijo Islands, together with Descriptions of their Post-Larval Stages. (Studies on Tsutsugamushi, Part 96.)** *Japanese J. Exper. Med.* 1957, Aug., v. 27, No. 4, 217–34, 2 figs. & 4 pls. [15 refs.]

Monthly studies from August 1954 to October 1955, on Hachijo Island (360 km. south of Tokyo) of the incidence of trombiculid mites on rats (*Rattus rattus* and *R. norvegicus*) and on the ground in fields near a village revealed seasonal changes in the abundance of several species. Those occurring mainly in summer ("summer-type" from June to November) were *T. hasegawai*, *T. wickmanni* and *Neoschöngastia posekanyi*; those of "winter-type" (with peak abundance in January) were *T. scutellaris* and, although detail is lacking, also *T. pallida burnsi*. The winter *T. scutellaris* is very widely distributed in the island—residential areas, jungles, fields and beaches. The summer-types have more specific environments, *viz.*, *T. wickmanni* (mountain jungle or cultivated fields), *T. hasegawai* (mountain jungle or bush by sea), *N. posekanyi*

(mountain jungle, and bush or rocks by sea). Within these definitions, distribution is further localized depending on actual details of the environment. Two other species, *N. solomonis* and *N. carveri*, were localized to sea-shore rocks, the habitat of the bird *Monticola solitarius*. Larvae were found in rock crevices subject to sea-water spray.

In a previous paper [this *Bulletin*, 1958, v. 55, 143] the clustering of larvae of *T. scutellaris* [presumed to be a vector of "winter scrub-typhus"] and stimulation to activity by carbon dioxide were described. The summer-type, however, do not cluster but seek holes, etc., individually. Experiments on their response to stimuli were possible, as in the paper cited above, provided the conical substrate was punctured with holes. There is a general discussion of results with different stimuli on these summer-type trombiculids. The following points are emphasized. Although carbon dioxide was important in activating the mites, it required to be in fairly strong concentration. In this there was a difference from *T. scutellaris*, activated by very weak carbon dioxide content in air. Moreover, sound and vibration did induce some activity in the summer trombiculids. There was, in this group, evidence in laboratory experiments of attraction and attachment only to birds by species known only to parasitize birds in nature (*T. hasegawai* and the species of *Neoschöngastia*). But *T. wickmanni* (and the winter-type *T. scutellaris*) which are natural parasites of mammals and birds, would respond and attach, in experiments, to birds and mammals. Attraction of the "bird-parasitic" species to an experimental avian host was evinced by approach from several centimetres; but feathers, and tubes of hot water, failed to elicit activity. [In the previous paper cited, and in the present one particularly, there is some scope for more detailed publication of the data supporting the interesting conclusions presented, both in results and detail of methods.]

Some notes are given on breeding through from larvae engorged on laboratory hosts and from this work descriptions are given for the first time of the nymph of *T. hasegawai*, *N. americana solomonis* and *N. posekanyi*, and the adult male of *T. hasegawai*. *D. S. Bertram*

See also p. 463, Sasa & Wakasugi, **Studies on the Effect of Carbon Dioxide as the Stimulant on the Tropical Rat Mite,** *Bdellonyssus bacoti* **(Hirst, 1913).**

Syrůček, L., Soběslavský, O. & Havlík, O. Isolace Coxielly burneti z rejska nejmenšího (*Sorex minutus*) v ohnisku Q rickettsiosy v severozápadních Čechách. [**Isolation of** *Rickettsia burneti* **from the Pigmy Shrew** *Sorex minutus* **in a Focus of Q-Rickettsiosis in North-Western Bohemia**] *Československ. Epidemiol., Mikrobiol., Imunol.* Prague. 1957, v. 6, No. 6, 392–5, 1 fig. [11 refs.] English summary (9 lines).

In an examination of 104 insectivores, caught in 1956 in an area in north-western Bohemia, affected by Q fever, *Rickettsia burneti* complement-fixing antibody was found in the sera of 4 of 83 shrews (*Sorex araneus*) and 1 of 14 pygmy shrews (*S. minutus*); no antibody was found in the sera of 7 moles (*Talpa europa*). The causative organism was isolated in 1 of 5 attempts by the inoculation of guineapigs with suspensions of spleen and liver of a pygmy shrew which showed serological evidence of infection. *D. J. Bauer*

Warner, P., Beech, Margaret & Casley-Smith, J. R. **Observations on Serum Antibodies in Aborigines of the Northern Territory.** *Med. J. Australia.* 1957, Dec. 14, v. 2, No. 24, 858–9.

"Fifty aboriginal sera were obtained from the Yuendumu area in the Northern Territory. Some of all of the sera were tested for evidence of infection with Murray Valley encephalitis (MVE), 'Q' fever, yaws and hydatid disease.

"There was no evidence that the incidence of MVE neutralizing antibodies (three of 27 sera) had changed since a survey of the area several years previously. The incidence of 'Q' fever antibodies (one of 36 sera) was of the same order as that obtained previously among aborigines in the Northern Territory, and as that of white people in South Australia. Four of the 50 sera yielding positive Wassermann reactions suggested that approximately anything up to one-fifth of the total population had been infected with yaws at one time or another. None of eight sera contained antibodies against hydatid disease."

[See this *Bulletin*, 1954, v. 51, 368.]

Enright, J. B., Sadler, W. W. & Thomas, R. C. **Thermal Inactivation of *Coxiella burnetii* and its relation to Pasteurization of Milk.** *Pub. Health Service Publication No. 517. Pub. Health Monograph No. 47.* Wash. 1957, Oct., pp. vi + 30, 7 figs. [41 refs.] [$0.25.]

In California, Q fever has been spread by raw milk. Since pasteurization does not always completely destroy *Rickettsia burneti*, experiments were conducted to obtain precise information on the times and temperatures required to eliminate this rickettsia.

It was found that the raw milk supplies of three cities, before pasteurization, were contaminated with *R. burneti*, 7·3% of 109 samples containing viable rickettsiae. In a second survey, 33·3% of 37 raw milk and 0·3% of 332 pasteurized milk samples were positive. It was then decided to study the shedding of rickettsiae in the milk of infected cows to obtain a figure for the maximum numbers likely to be found in contaminated milk. In the two surveys already mentioned, the greatest number found was 1,000 guineapig infective doses in 2 ml. of milk, but the highest figure known is 10,000/ml.

A section of the monograph is devoted to an extensive description of the methods employed to demonstrate viable rickettsiae in milk. Four methods are described, but the one ultimately adopted was that of two passages in guineapigs followed by a complement-fixation test on the guineapig serum. It was found to be specific for small numbers of viable rickettsiae; unlike single guineapig inoculation it was not affected by the presence of dead rickettsiae. Sera having a titre of 1 in 32 or greater were considered positive.

In order to determine the conditions of pasteurization necessary to destroy all rickettsiae, careful laboratory thermal inactivation experiments were performed for both vat and high-temperature, short-time (HTST) methods. Known concentrations of rickettsiae were suspended in whole milk and heated to different temperatures for different times. Temperatures were recorded accurately by thermocouples and times corrected by a factor calculated to account for the heating-up and cooling-down of the samples. Trials covered a temperature range of 141°–151°F. and time intervals of 1·74–55·29 minutes. The absence of good sampling devices for accurate observation in the region of 155°–163°F. prevented controlled observations in this range. Extrapolation of the time-temperature curve gave figures for this zone. It was found that the normal pasteurization standard, 143°F. for 30 minutes, is inadequate to destroy all rickettsiae whereas heating to 145°F. for 30 minutes destroys them all. A similar result (by extrapolation) can be obtained at 161°F. for 15·4 seconds.

As commercial pasteurization equipment differs greatly from the carefully controlled laboratory set-up, a sample of milk inoculated with *R. burneti* was pasteurized in the vat and HTST types of commercial plant at different temperatures for different times. With vat pasteurization, 143°F. for 30 minutes was inadequate, but 145°F. for 30 minutes was efficient. Results for HTST plant showed that the present pasteurization curve is very close to the thermal inactivation point of *R. burneti* and when milk was heated above 158°F. no viable rickettsiae were recovered.

The monograph ends with the recommendation that vat pasteurization temperatures should be raised to 145°F. for 30 minutes. Other dairy products which have a high fat content or added sugar often require higher temperatures to destroy micro-organisms. For these, temperatures of 150°F. for vat and 166°F. for HTST methods are advised.

May F. McCallum

Pirsch, J. B., Mika, L. A. & van der Maaten, M. J., with the technical assistance of D. H. Davisson. **Hyperreactivity of *Coxiella burnetii* infected Guinea Pigs to Subsequent Injections of Bacterial Endotoxins.** *Proc. Soc. Exper. Biol. & Med.* 1957, Nov., v. 96, No. 2, 376–80. [16 refs.]

Guineapigs infected intraperitoneally with *Rickettsia burneti* in doses of 10^6 ID50 or more became highly sensitive to endotoxins of *Brucella*

suis, *Escherichia coli* and *Salmonella typhi*. Sensitivity was maximal 48–72 hours after infection, when intracardiac inoculation of 25 μgm. of *Br. suis* endotoxin or 10 μgm. of *E. coli* or *Salm. typhi* endotoxin caused death 6–24 hours later in some animals. Injection of 10^8 ID50 of formalin-inactivated *R. burneti* did not produce hypersensitivity. Infected animals which died after endotoxin inoculation showed haemorrhage, hyperaemia and leucocytic infiltration of the adrenal cortex; renal cortical necrosis was not observed. It is suggested that this hyper-reactivity is a manifestation of the generalized Shwartzman reaction.

R. S. F. Hennessey

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

Jefferson Medical College of Philadelphia. **Yellow Fever. A Symposium in Commemoration of Carlos Juan Finlay** [Soper, F. L., Chairman]. 1955, 22–23 Sept. 101 pp., numerous figs. [Numerous refs.] [? 1957.]

This symposium under the chairmanship of Dr. F. L. Soper commemorated in Finlay's medical school the centenary of his graduation there as a doctor in 1855. It contains two biographies of Carlos J. Finlay, one anonymous and one by Major-General A. J. Orenstein (*Carlos Juan Finlay, Class of 1855*, pp. 95–101). These sketch Finlay's life and his medical environment, and tell of his 20 years' battle in favour of his theory of the transmission of yellow fever by *Aëdes aegypti*, which was not accepted until the Cuban epidemic in 1900 when Reed, leading the Yellow Fever Commission, put it to the test and found it true.

Dr. Pedro Nogueira (*The early history of yellow fever*, pp. 1–13) holds that yellow fever existed endemically in the Americas before the Conquest. He described the many aetiological agents suggested and their rejection after investigation, until the crucial experiment on human volunteers proved transmission by a mosquito. Dr. A. F. Mahaffy (*Progress in the conquest of yellow fever during the period 1905–1930*, pp. 15–23) then recounted the history from 1905 to 1930, during which time urban epidemics were controlled by anti-*Aëdes* campaigns. A new phase began in 1928 when an epidemic broke out in Rio de Janeiro after 20 years' freedom. The occurrence of cases in numerous places over a wide area cast doubt on the "key centre" theory. Meanwhile in Africa the Rockefeller Foundation was searching for the virus and eventually isolated it from Asibi. Other notable advances were the employment of the

rhesus monkey as an experimental animal and the development of the protection test.

Jungle yellow fever (pp. 25–31) was discussed by Dr. J. C. Bugher who emphasized the numerous variations in the virus cycle and recalled that in 1905 Sir Patrick Manson had suggested the possible importance of monkeys in the epidemiology. Dr. J. A. Kerr (*Yellow fever—the Saraswati of virology*, pp. 33–38) contributed an address on the virology, immunology, zoology and ecology of the disease [Saraswati is the Hindu Goddess of Wisdom and Learning, and is portrayed with 4 arms]. He pointed out the great advances in virology following the isolation of yellow fever in Indian monkeys, and the immunological relationship apparently existing between this and other viruses such as dengue, Japanese B and St. Louis. Dr. O. P. Severo (*Eradication of the Aëdes aegypti mosquito from the Americas*, pp. 39–59) dealt with the campaign against *Aëdes aegypti* starting with Gorgas, Ribas and Oswaldo Cruz in 1901–03. The Rockefeller Foundation in 1932 undertook eradication of the vector in urban areas throughout Brazil except Rio de Janeiro, and developed the principles necessary for success. In 1945 DDT was employed for the first time against this vector, perifocal spraying was evolved and was employed in 1948 in the continent-wide campaign. The second half of this paper reviews progress in the campaign for eradication of *Aëdes aegypti* throughout the Americas. Only one territory in South America has not started an eradication campaign and most territories are in the final stages of elimination or have abolished the vector. In Central America campaigns are under way in all countries, though many of the Caribbean islands are still infested and the campaigns are not yet efficient. In North America, Mexico has a campaign in progress but no steps have yet been initiated in the United States. It is emphasized that only eradication of *Aëdes aegypti* removes "the menace of jungle virus" [presumably meaning the threat to former *Aëdes aegypti* areas—eradication of this mosquito obviously cannot protect against infection by jungle species]; in countries where campaigns are conducted not a single infection from *Aëdes aegypti* has occurred.

Dr. J. Boshell M (*Yellow fever in Central America*, pp. 61–69) discussed the post-war spread of yellow fever in Central America. Surveys had not revealed the disease in man west of the Panama Canal until cases were found between 1950 and 1952. Mortality of monkeys due to the disease was high and the epizootic travelled 800 miles in under 5 years. It is suggested that the disease had not affected Central American monkeys for a long time and that the enzootic potentiality is higher in areas where the animal population is less susceptible and the vector less efficient. The possible role of marsupials and less efficient insect vectors is discussed in relation to the development of new enzootic foci. Dr. W. G. Downs (*Epidemiological notes in connexion with the 1954 outbreak of yellow fever in Trinidad, B.W.I.*, pp. 71–78) contributed a paper on the epidemiology of the recent epidemic in Trinidad. In 1954 virus was

isolated from a forest worker and later 15 cases were diagnosed; hundreds probably remained unrecognized. Virus was isolated from monkeys and pools of *Haemagogus* mosquitoes. Most human cases were probably contracted in the jungle but 3 possibly from *Aëdes aegypti*. Difficulties of diagnosis are emphasized and details of some cases are given. The origin of the epidemic remains obscure.

Dr. F. L. Soper contributed a paper entitled *The unfinished business with yellow fever* (pp. 79–88). This points out the change in the reported distribution of the disease in America and Africa since jungle yellow fever was recognized. Entirely different problems are presented by the two epidemiological forms of the disease. In view of air travel eradication of *Aëdes aegypti* in endemic areas is necessary to protect the rest of the world and in failing to undertake this the United States is threatening its own future and its influence on other nations of the continent.

Dr. J. E. Smadel (*The glory of the united effort in a great crusade*, pp. 89–94) stated that the intensive drive on the problem of yellow fever was provided by 5 men with deep humanitarian and scientific interests, of whom 4 worked in the framework of the Rockefeller Foundation. This body is withdrawing from the problem and the task is now taken on by the Pan American Sanitary Bureau. Tribute is paid to the staff of the various organizations which contributed to the successful solution.

[This series of papers by a number of the world's leading authorities gives a comprehensive survey of yellow fever in its different aspects. It will provide much to interest even those best informed about the disease.] *T. H. Davey*

Kellett, F. R. S. & Omardeen, T. A. **Tree Hole Breeding of *Aedes aegypti* (Linn) in Arima, Trinidad, B.W.I.** *West Indian Med. J* 1957, Sept., v. 6, No. 3, 179–88, 2 figs.

This paper has already appeared in the Annual Report of the Malaria Division, Trinidad and Tobago Health Department and has been abstracted [this *Bulletin*, 1958, v. 55, 27].

Macnamara, F. N. **A Clinico-Pathological Study of Yellow Fever in Nigeria.** *West African Med. J.* 1957, Dec., v. 6 (n.s.), No. 4, 137–46. [12 refs.]

Between 1951 and 1954 epidemics of yellow fever swept across Eastern Nigeria. It was possible to transport laboratory facilities to epidemic areas, with the objects of studying not only the clinical picture in the Nigerian but also the use of clinico-pathological procedures and the intensity and timing of virus circulation in the blood.

Cases (all confirmed by laboratory methods) were classified as mild (one-third of all cases), moderate or severe. In the example given of a

mild case the patient was ill for less than a week, had no jaundice, enlargement of liver or bradycardia, and only a trace of albuminuria. Serious cases presented the classical picture. Illness seldom persisted for more than 12 days, but in a few instances was prolonged for more than two weeks: one patient died on the 17th day. The prolonged form might closely resemble infectious hepatitis.

The quantity of virus circulating in the blood, estimated by the inoculation of mice, was highest in the first 2 or 3 days of illness. Although there was a tendency for patients suffering a mild attack to circulate less virus, and for a shorter period than those more seriously afflicted, they could have infected mosquitoes. A zonal phenomenon was noted in some titrations, higher dilutions infecting mice where lower ones did not. There was a tendency for prothrombin levels to fall from an early stage in the illness, but not very markedly. [This investigation was followed up in very few cases.] Little diagnostic information was gained from repeated white blood counts. Differential counts never varied significantly from the normal; no patient exhibited eosinophilia. After a mild early leucopenia, leucocytosis might develop in severe cases. No albumin was found in the urine in nearly half of the 140 specimens examined. When present the amounts tended to increase on the 3rd and 4th days of illness. Albuminuria was more marked in serious cases, and tended to persist into the period of convalescence.

These observations emphasize the great difficulty of diagnosing yellow fever, except in its classical form (less than one-quarter of all cases) by purely clinical means. *B. B. Waddy*

Bearcroft, W. G. C. **The Histopathology of the Liver of Yellow Fever-Infected Rhesus Monkeys.** *J. Path. & Bact.* 1957, Oct., v. 74, No. 2, 295–303, 11 figs. (10 on 2 pls.). [13 refs.]

The histopathology of the liver was studied by serial liver biopsy in 8 *Macaca mulatta* monkeys infected with yellow fever virus (7 with the Asibi strain, one with Kintampo strain). 3 had been immunized previously against the Zika virus and had demonstrable antibodies.

Liver biopsies were performed with a Roholm-Iversen trocar through the right subcostal region before and after infection with yellow fever. Autopsy specimens were also examined. Material was fixed in formol-Zenker and sections stained by Ehrlich's haematoxylin and Gomori's silver impregnation methods.

The earliest pathological change appeared about 3 days after infection. There was necrosis of scattered individual polygonal cells mostly in the midzonal region, and localized mononuclear inflammatory reaction. No intranuclear inclusions were present at this stage.

The lesions progressed rapidly in the 36 hours preceding death, during which intranuclear bodies appeared. The foci of necrosis spread radially, became confluent and eventually produced irregular midzonal necrotic

areas. Zones of surviving cells remained around the portal tracts and central veins. Some lymphocytic infiltration developed late in the connective tissue of the portal tracts and about larger hepatic veins.

The animals immunized against the Zika virus survived longer than the others and in one the development of the lesions was modified. The author suggests the possibility that previous infection with the Zika virus might modify the course of yellow fever in man.

B. G. Maegraith

World Health Organization. Technical Report Ser. No. 136. **Expert Committee on Yellow Fever Vaccine, Geneva, 8–13 April 1957. First Report.** 21 pp. 1957. Geneva: Palais des Nations. [Sales agent for U.K., H.M. Stationery Office.] [1s. 9d.; $0.30; Sw.fr. 1.–.]

Under the International Sanitary Regulations, which came into force on 1st October 1952, an international certificate of vaccination or revaccination against yellow fever is valid only if the vaccine used has been approved by WHO. The standards to which yellow fever vaccine was to conform were specified by UNRRA and dealt with the preparation, preservation and administration of the vaccine. The standards were published in 1945 in the UNRRA *Epidemiological Information Bulletin*, v. 1, 365; they were subsequently adopted by WHO and are still in force. These standards, however, required the use of the 17D strain of yellow fever virus and prescribed certain potency, safety and sterility tests for the vaccine, which was to be administered by subcutaneous injection; they made no provision for the use of yellow fever vaccine administered by cutaneous scarification, although in fact, on the basis of acceptable antigenic potency results alone, a vaccine so administered—one produced not from 17D but from the French neurotropic strain of yellow fever virus—was approved by UNRRA and later by WHO for purposes of international certificates of vaccination against yellow fever. In the circumstances there was obvious need for a reconsideration of the UNRRA standards and to this end, as well as to study a number of related laboratory problems, an expert committee was convened by WHO in April 1957.

In its report, therefore, the committee has not only suggested certain revised minimum requirements as regards potency and safety to be used in determining approval by WHO of yellow fever vaccines for use in international travel, but has also summarized the results of its discussions on the following subjects: maintenance of the 17D strain; yellow fever vaccine administered by cutaneous scarification; the mouse protection test; and encephalitis following yellow fever vaccination.

In the first place the committee recommends that the minimum requirements for yellow fever vaccine described in Annex 1 of its report should be substituted for the UNRRA standards. This annex deals: in Part I,

with minimum requirements for vaccine for use in international travel; in Part II, with minimum requirements for the safety of the vaccine in regard to the individual vaccinated; and, in Part III, with recommendations for the manufacture of vaccine for subcutaneous injection. In Part I detailed potency tests are prescribed for the prepared vaccine, which must be shown to contain: for subcutaneous injection, not less than 1,000 mouse LD50 of modified yellow fever virus per dose; and for cutaneous scarification, not less than 500,000 mouse LD50 per ml. In Part II special consideration is given to the monkey safety test, which guards the neurotropism of the strain: not less than 10 monkeys shall be used for each test and not more than 2 of the animals under test shall develop encephalitis. Instructions accompanying vaccine containers shall show, in separate statements, that the vaccine has passed the requirements for international travel and for safety prescribed in Parts I and II, respectively. The contents of Part III of the annex are meant to remain recommendations only; no recommendations are given on preparing vaccine for administration by scarification, because this is a field in which a considerable amount of research work is still being conducted.

The remaining items in the committee's report are now dealt with *seriatim*. As regards maintenance of the 17D strain, it is of particular importance that the strains used for vaccine production should maintain their ability to confer immunity on vaccinated persons, without causing harmful side effects. Research into the effect of desiccation and of varying conditions of storage on the characteristics and genetic properties of modified virus used for vaccination is, therefore, advocated. As in the case of the French neurotropic strain, the growth curves and the genetic homogeneity of the 17D strain to determine means for obtaining preparations of maximum active and minimum inactive virus contents require close investigation. For such research and investigation, as well as to ensure the distribution of vaccine seed lots of the best available type, the designation by WHO of a central laboratory should be considered. For mass immunization in territories where, owing to the continued presence of yellow fever among wild animals, repeated vaccinations may be required for an indefinite period, an inexpensive vaccine for cutaneous scarification can be prepared by growing the virus in mouse brain, with the use of either the Dakar or the 17D strain. In this connexion it is recommended that the titre of 17D vaccine so administered should be as high as possible to achieve as high an immunity rate as possible after vaccination. In order to ensure that, in evaluating the immunity conferred by vaccination, the results obtained with the mouse protection test in different laboratories can be compared, the committee recommends the adoption of a standardized yellow fever neutralization test—a test which is described in detail in Annex 2 of the report. It is also recommended that WHO should, on request by laboratories, make available as reference sera, the immune serum and non-immune serum specified in Annex 2 for use in the standardized test. As regards encephalitis, which has been

observed to follow vaccination with the mouse brain and 17D strains alike, it is clear that factors making one person more likely to develop the reaction than others require further research. A most important factor, however, is the age of the person vaccinated, the majority of cases occurring in children less than one year old. Investigation should be made, therefore, to find practical methods of protecting infants against yellow fever other than by vaccination, particularly in those regions where encephalitis has been known to complicate vaccination. *G. Stuart*

DENGUE AND ALLIED FEVERS

Hadlow, W. J. **Histopathologic Changes in Suckling Mice infected with the Virus of Colorado Tick Fever.** *J. Infect. Dis.* 1957, Sept.–Oct., v. 101, No. 2, 158–67, 12 figs.

Colorado tick fever is a tick-transmitted virus disease of man and is a common human infection in western United States. Hamsters and mice are used for isolation of the virus; the suckling Swiss albino mouse is the animal of choice in the author's laboratory, for the primary isolation of virus from the blood of patients and from the tick vector, *Dermacentor andersoni.*

Swiss albino mice of 3 to 4 days old were inoculated by the intraperitoneal route with suspected material. Clinical signs of infection occurred in the mice 6 to 8 days later with tremors of the extremities, hyperirritability and incoordination; death usually occurred within 24 hours of the onset of symptoms. The major microscopic changes were constant and the primary lesion appeared to be widespread necrosis of cardiac muscle fibres accompanied by a moderate mononuclear-cell inflammatory response. Liquefaction necrosis of cerebellar folia was the principal intracerebral lesion; necrosis and mild inflammatory changes often occurred throughout the brain. In general the lesions appeared to be peculiar to Colorado tick fever virus infection. *R. Lovell*

RABIES

Nikolitsch, M. Viruskonzentration und Inkubationslänge. [**Virus Concentration and Length of Incubation Period**] *Arch. f. Hyg. u. Bakt.* 1957, July, v. 141, No. 5, 361–7.

Mice were inoculated intracerebrally with street rabies virus and on successive days a mouse was killed and a 10% suspension of the brain was inoculated intracerebrally into 3 mice. The mean incubation period in the latter fell steadily from 18·5 days in the group inoculated with brain

suspension harvested after 1 day, to 8·6 days in the group subinoculated after 10 days when symptoms were beginning to appear in the original group of mice. The mean incubation period was evidently inversely proportional to the amount of virus in the brain used for inoculation. The incubation period rose to 12·6 days in mice inoculated with brains harvested after the appearance of symptoms, presumably as a result of a decline in virus concentration, and the author suggests that the further course of the disease is due to the action of exotoxins. [The incubation period method for titrating viruses was first developed by Gard (*Bull. Hyg.*, 1940, v. 15, 741) who showed with mouse encephalomyelitis virus that the reciprocal of the harmonic mean incubation period was related in a linear manner to the virus titre.] *D. J. Bauer*

Schindler, R. Vergleichende Untersuchungen über das Verhalten von weissen Laboratoriumsmäusen und Feldmäusen (*Microtus arvalis* Pallas) nach der Infektion mit Tollwutvirus. [**Comparative Investigations on the Behaviour of Mice and Continental Field Voles (*Microtus arvalis*) after Infection with Rabies Virus**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1957, v. 8, Nos. 1/2, 233–41. [Numerous refs.]

In an investigation of the comparative sensitivity of continental field voles (*Microtus arvalis*) and laboratory mice to infection with the Berlin strain of street rabies virus, in which an intracerebral titration was carried out in parallel in groups of 48 animals, respective titres of 3·74 and 3·80 log units were obtained. In further titrations in which 120 continental field voles and 240 mice were used, titres of 3·44 and 3·80 log units were obtained with intracerebral infection, and a somewhat higher titre in the voles (2·05 compared with 1·75 log units) with intramuscular infection. Negri bodies were observed in both groups of animals. The incubation period was longer in voles (11·5 compared with 9·8 days), but the duration of illness was shorter (1·0 compared with 4·2 days) and they died without showing marked signs of infection. Virus was present in the salivary glands of voles and mice in titres of 2·11 and 0·93 log units respectively. The findings suggest that continental field voles may play some part in the spread of rabies in natural conditions, and that the disease may be responsible for the sudden declines in rodent population which are observed from time to time. *D. J. Bauer*

Pearson, H. E., Atanasiu, P. & Lépine, P. La multiplication du virus rabique dans un astrocytome transmissible chez la souris. [**Propagation of Rabies Virus in a Transplantable Astrocytoma in Mice**] *Ann. Inst. Pasteur.* 1958, Jan., v. 94, No. 1, 1–6, 3 figs.

The English summary appended to the paper is as follows:—

"Sub-cutaneous transplantation of this astrocytoma to C3H mice

induces after 13 to 20 days the formation of tumors weighing 5 to 10 g. These tumors allow the propagation of rabies virus, and the titer is almost the same as the one obtained in the CNS after intracerebral inoculation.

"Rabies virus induces in tumor cells the formation of pycnotic nuclei, and necrosis.

"The death of mice having received the infected tumor is provoked by the rabies virus (after 14 to 15 days). The death of mice having received the infected tumor plus antirabic serum is due to the tumor; the animals die 25 to 35 days after inoculation."

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

Srikantan, T. N., Agarwala, S. C. & Shrivastava, D. L. **Studies in the Enzyme Make-Up of** *Pasteurella pestis*. **Part V. Dehydrogenase Activity of Virulent and Avirulent Strains.** *Indian J. Med. Res.* 1957, Oct., v. 45, No. 4, 467–74, 5 graphs.

"1. Resting cells of *P. pestis* were capable of dehydrogenating a large number of substrates in the presence of phenyl tetrazonium chloride. Glucose showed the maximum activity. Lactic acid, succinic acid and cysteine were next in order. Glycerol showed no dehydrogenation.

"2. The optimum pH for dehydrogenation of lactate was found to be 7·0 for both virulent and avirulent strains.

"3. Using 8 virulent and 8 avirulent strains of *P. pestis*, no general correlation was found between virulence and dehydrogenation in this organism.

"4. Succinic dehydrogenation was almost completely inhibited by chlorotetracycline and only partially by oxytetracycline, tetracycline, chloromycetin, neomycin and dihydrostreptomycin."

[See this *Bulletin*, 1957, v. 54, 1186.]

CHOLERA

In this section abstracts are arranged as far as possible in the following order: epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

i. Pollitzer, R. **Cholera Studies. 10. Epidemiology.** *Bull. World Health Organization.* Geneva. 1957, v. 16, No. 4, 783–857. [Numerous refs.]

ii. ———. **11. Prevention and Control.** *Ibid.*, 1957, v. 17, No. 1, 67–162. [Numerous refs.]

i. The principal endemic centre, the very home of cholera, is recognized as Bengal State and includes neighbouring areas of Assam, Bihar and Orissa, together with the delta of the Cauvery river in Madras State. In Indonesia, the Philippines, Indo-China and in the great central plain of China itself, though endemicity has frequently become established for limited periods, the disease cannot be said to be permanently established. The characteristics of an endemic area are location around a river, especially in its delta, where a high water table exists, a high population density with primitive living conditions, and an atmosphere of high absolute humidity. In such areas a herd immunity develops and an equilibrium is established between the organism and its human host; this may be disturbed by periodic famine which lowers the hosts' resistance, or by an influx of non-immune people, to allow the disease to burst out in epidemic proportions.

Man alone is responsible for the epidemic spread of the disease to areas formerly free from it; the possible role of birds and fish as carriers having been excluded. His activity as a disseminator of the vibrio is facilitated by warm, humid weather, in which the susceptible population drink more water which he has contaminated, eat more fresh fruit on which the organism can persist as a surface contaminant, and are more exposed to flies which are efficient, though local, passive vectors. Heavy rain, however, may tend to arrest the progress of an epidemic. Fairs and other gatherings, including the massing of armies in the field and segregation of the civil population by their operations, which disrupt the control of pure water supplies and impose insuperable sanitary problems, are infamous breeders of cholera epidemics. The occurrence of a long-term rhythm or periodicity in the epidemic occurrence of cholera has been much discussed, with little agreement, though in an endemic area a rise in absolute humidity to over 0·400 (*i.e.*, a partial pressure of water vapour of 0·400 inch Hg) after a dry period will favour the outbreak of an epidemic should a susceptible population be present.

The two classical serotypes of *Vibrio cholerae*, the Inaba and the Ogawa strains, though their relative incidence may vary from place to place and from time to time during an epidemic, do not differ significantly in virulence, and this also applies to the third recognized strain, named

Hikojima. Transmutation from one strain to another, though it has been suggested, is now generally denied.

Of the possible modes of infection, direct contact, though it may lead to the slow spread of the infection from one group of persons to the next, is of little epidemiological importance: water-borne dissemination of the vibrio provides the paramount factor. It is perhaps illuminating to recall at this point that Victorian England was rife with cholera; in 1854 contamination of a London well caused 500 deaths within 10 days among those who drew water from the Broad Street pump, while there was a high incidence of the disease among the consumers of Thames water supplied by the Southwark and Vauxhall Water Company though those patronizing the Lambeth Water Company, who had recently removed their intake to Thames Ditton, remained comparatively free from the infection. In 1849 an outbreak in Taunton and Bridgwater was attributed to the consumption of infected oysters, and the same agency was held responsible for an epidemic in Grimsby and Cleethorpes as recently as 1893. Carriage of the infection down the course of rivers is a well-recognized phenomenon in the East while transmission of the disease in canal waters supplying a succession of villages has often been noted in South India. Instances of epidemics arising from the surface contamination of fish which is eaten in the raw state came from Tokyo, Japan, while shellfish, fruit and salads, when sprayed for freshening purposes with infected water, constitute further notorious agencies. A suggestion that certain fresh-water fish (*e.g.*, *Hilsa ilisha*) may provide an endemic reservoir of infection in India and that their periodic migrations may determine the onset of epidemics in riverine communities, which was based on the finding of cholera-like vibrios within the gut, has been disproved, though the presence of non-pathogenic cholera-like vibrios in *Hilsa* and many other species has been confirmed.

The role of human carriers in the maintenance of endemicity and the production of epidemics is a subject of great importance and difficulty. Reports from many countries on the duration of the convalescent carrier stage suggest that, while in the majority the stools cease to contain vibrios by the end of the first week of the disease, a substantial proportion of patients will excrete them for 2 weeks and a small minority for as long as 4 weeks. Healthy "contact" carriers, whose incidence may reach 7% of the population in epidemic periods, excrete vibrios for short periods only, usually up to 5 days, rarely for 10 days. A proportion of these, however, usually prove to be incubatory carriers. It is of importance that strains of *V. cholerae* obtained from such healthy contact carriers tend to possess a virulence lower than that shown by organisms isolated from cholera patients. It must be concluded that we do not yet fully understand either the mechanism which maintains endemicity or that which initiates epidemics.

ii. In the prevention of the disease, the measure of paramount importance is the provision of a pure water supply, which, to provide a high

degree of safety, must be piped and delivered directly to the consumer by tap. The possibility of the contamination of deep wells by infected subsoil water from bore-hole latrines is now considered negligible, provided that a filtration distance in excess of 25 feet is provided. The great danger lies in their contamination by surface water and by ropes and buckets. Tube wells should provide a very practical and inexpensive solution of the problem of a pure water supply in endemic regions. Improvement in environmental sanitation, though important, takes precedence far below that of the provision of a safe water supply. Other public health measures include the supervision of markets and stalls selling food, such as fruit, which is to be eaten raw, and drinks, and the provision of an intelligence service to detect the disease in its early epidemic stage. The treatment of cholera carriers is a subject which has aroused much controversy, but the author of this review is of the opinion that effort should not be diverted to this from more important measures of epidemic control. On the balance of evidence, sulphaguanidine given in full doses for 5 days cleared the stools of carriers in a significantly shorter time than the natural persistence of vibrios in controls, but it is probable that certain antibiotics, as recorded in an earlier section, are more efficient. The safe disposal of the dead may present problems when measures proposed conflict with religious scruples, but an acceptable compromise whereby the corpse is washed in an antiseptic solution with which the shroud is also impregnated, and is protected from flies, can usually be achieved. Disinfection must include vomitus as well as excreta, fomites and the floor, walls and furniture of the sickroom. Temporary water points may have to be installed in epidemic centres, and existing wells may be closed or chlorinated. Mass prophylaxis by the administration of the essential oil mixture introduced by Tomb in 1926 is now generally discredited, though in limited populations, such as hospital staffs, the daily administration of a sulphonamide, preferably 1 gm. of phthalyl sulfacetamide, has proved effective. The use of bacteriophage in this connexion appears now to have fallen into disrepute. The active immunization of pilgrims and of potential cholera contacts by a high-titre killed vaccine (8,000 million organisms per ml.) has undoubtedly achieved spectacular success, though the immunity produced is of short duration and is considered by international agreement as effective for 6 months only.

The provisions of the 1951 International Sanitary Regulations are less rigorous and more practical than many previous codes. Routine stool examination has been abandoned and can now be enforced only in the case of clinically suspected persons. Quarantine of crew and travellers of an infected ship or aircraft is limited to 5 days, while those in possession of a valid certificate of anti-cholera vaccination are released subject to surveillance. The ship or aircraft itself is released after disinfection and treatment of potentially infected food and water supplies.

[Cholera presents a rapidly decreasing menace to the western world,

though the 1947 epidemic in Egypt remains as a salutary warning against undue complacency.] *J. H. Walters*

Chatterjee, H. N. & Das, S. K. **Control of Hyperpyrexia in Cholera.** [Correspondence.] *Lancet.* 1957, Dec. 28, 1339–40, 2 figs.

In acute cholera, though the rectal temperature is raised from the early stages of the illness, the skin, reflecting the grave circulatory collapse, is cold and clammy, especially at the extremities, and the axillary temperature is subnormal. Overt pyrexia develops, however, in every patient to whom a saline infusion is given; in patients whose initial rectal temperature exceeds 101°F. there is a danger that saline infusion may precipitate a dangerous or fatal hyperpyrexia. This danger is matched or exceeded by that of irreversible shock, should infusion be withheld.

The authors, during an epidemic in India in 1956, using parenteral deoxycortone acetate to combat shock, were surprised and gratified to note that it also appeared to control the pyrexial effect of saline infusion. In a controlled experiment on 30 patients suffering from acute cholera who had rectal temperatures of 101°F. or more, all 15 who received a single intramuscular injection of deoxycortone 10 mgm. soon after saline infusion had been initiated became afebrile within 24 hours. There was one fatality from circulatory failure. Of the control group of 15 patients, whose treatment was identical save for the omission of the parenteral deoxycortone, only 2 became afebrile after 24 hours, 10 in 48 hours and 1 only within 72 hours. There were 2 deaths on the second day, one from hyperpyrexia and circulatory failure, and one from pure circulatory failure. Two temperature charts illustrate graphically the advantage of steroid therapy in this connexion.

[A most valuable addition to accepted therapy.] *J. H. Walters*

Rogers, L. **Thirty Years' Research on the Control of Cholera Epidemics.** *Brit. Med. J.* 1957, Nov. 23, 1193–7, 1 map. [12 refs.]

This very important paper will certainly take a foremost place among the classic contributions to the literature of cholera prevention.

It opens with a brief mention of the author's early work in Calcutta in 1908–1921 when he achieved fame by his remarkable success in greatly reducing the fatality rate among cholera patients by his scientific method of intravenous treatment. This success, however, left him dissatisfied; the treatment was available only to the relatively small number of patients who could be treated at hospitals with the necessary trained staff and special equipment. Sir Leonard remained obsessed by the thought that an average number of more than 300,000 persons had been, and still were, dying of the disease every year. So it came about that in

1925, soon after his retirement from the Indian Medical Service he undertook a task which was to become " Thirty Years' Research on the Control of Cholera Epidemics ".

The present paper contains a brief summary of the early stages of this research in which a detailed examination was made of the meteorological and other conditions which showed an association with the occurrence of the disease, especially in the epidemic form which was responsible for the greater part of the mortality.

Descriptions have already been published by Sir Leonard of the remarkable tendency of epidemics to decline and die out when the absolute humidity of the air falls well below 0·400 and to increase when this rate rises considerably above 0·400 [this *Bulletin*, 1929, v. 26, 83]. Regular observations of the absolute humidity rate have been found helpful in the prediction of the date and severity of the yearly spring rises in the prevalence of the disease in certain parts of India.

A more easily explained association between cholera epidemics and climatic conditions was detected by finding that each of the three greatest epidemics which had occurred in India over a period of 45 years had occurred in the year following a widespread failure of the monsoon rains and that 40 of the 41 provincial epidemics of cholera had followed local failures of the previous monsoon. In these cases the crowding of badly nourished communities in famine camps provided conditions especially favourable to the spread of intestinal infection. In the only case in which a provincial epidemic occurred in the absence of a failure of the previous monsoon the explanation was obvious; the outbreak occurred in 1894 during and after one of the particularly large Kumbh Melas which are held in Allahabad every 12 years. At this Mela a million pilgrims attended and were crowded together in a small space of sands of the Ganges River. The absolute humidity had been greatly in excess during the winter months and especially in February when the main spread of cholera occurred.

Vivid descriptions are given of the conditions prevailing at the annual pilgrimage fairs. Two of these, held at Allahabad and Hardwar, are especially sacred in every twelfth year when one to three million pilgrims attend. It became clear that the yearly 20 million or more pilgrims have been chiefly responsible for the spread of epidemic cholera and that the only possible way of controlling these epidemics would be the compulsory inoculation of all pilgrims before they reached the fairs. Sir Leonard, therefore, drew up a memorandum in which he gave details of the repeated spread of the disease during and after the fairs and strongly advocated compulsory inoculation. This was in 1926, but the unanimous verdict of the public health officers of India was to declare the proposal impractical as being an interference with the religious customs of the people.

However, in 1936, soon after provincial autonomy had been granted to India, the medical administration of the Bombay Presidency had the

courage to order the compulsory inoculation of pilgrims to the Pandarpur Fair, which had long been a distributing centre for cholera in the Bombay Deccan. The result was an immediate success, and four years later the Bombay Public Health Office was able to report that since inoculation became compulsory there had been no outbreak of cholera at the Fair.

This success encouraged the Central Advisory Board of Health of India to investigate the problem in 1939 and in 1940 to sanction trials of the method in every part of India.

The numbers of inoculations in India from 1928 were as follows:

1928–33.	Average yearly	2,700,000	All voluntary.
1934–39.	,, ,,	6,694,000	Voluntary except in the Bombay Deccan.
1940–51.	,, ,,	22,500,000	Compulsory for all pilgrims.

A survey was made of the influence of the great fairs held every 12 years at Allahabad since 1882 on the cholera death rates in the United Provinces [now called Uttar Pradesh] [*ibid.*, 1953, v. 50, 306]. The average yearly death rate per 1,000 persons in the years of the 6 fairs held from 1882 to 1930 was 2·57; in the fair held in 1942 when nearly 1,250,000 pilgrims were inoculated the rate was only 0·1 and in the latest great fair in 1954, when just over 2 million persons were inoculated, it was 0·04.

In the same years the death rates from cholera in Bihar and Orissa, from which pilgrims also came to Allahabad, showed very great reductions, and Sir Leonard estimates that the saving of lives in the above provinces was 146,200 in 1942.

Compulsory inoculation of over one million pilgrims at the 1950 great 12-yearly fair at Hardwar was followed by a great reduction in the death rate for cholera in the Punjab to only one-ninetieth of the average rates for the previous 7 great fairs since 1867.

The reduction in the death rate was not restricted to the areas from which the pilgrims came. The rate for all India in the years 1930–39 averaged 0·65 per 1,000, whereas in 1946–48 it was 0·5 and in 1954–55 it was 0·05. This remarkable fall "cannot but be due to a cumulative effect of the compulsory anti-cholera inoculations of the last 15 years, which now amount to approximately 300 millions".

As was expected the greatest reductions occurred in the epidemic areas where they ranged from a fall to one-twelfth in the United Provinces [Uttar Pradesh] to one-forty-fifth in Bombay and the Central Provinces. There was complete elimination of the disease in Punjab (India).

In the endemic areas in north-eastern and south-eastern India the usual fall ranged from 9-fold to 13-fold.

All the indications up to the present time go to suggest that the "cholera incidence in India as a whole is gradually being brought under control by the general adoption of compulsory inoculation of . . . pilgrims". [In estimating the value of medical research Sir Leonard

has always attached special importance to the resultant saving of life and prevention of illness; it is, therefore, not surprising to find that he thinks his research into the prevention of cholera in India likely, in time, to be recognized as his most important work.] *John W. D. Megaw*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Elsdon-Dew, R. **Amoebiasis. A Summary of Literature published in 1953.** 30 pp. [319 refs.] Durban: Amoebiasis Research Unit, C.S.I.R., P.O. Box 1035.

Brooks, T. J., Jr. **Notes on the Mitosis of** *Entamoeba histolytica*. *Amer. J. Trop. Med. & Hyg.* 1957, Nov., v. 6, No. 6, 1001–3, 2 figs.

"A trophozoite of *Entamoeba histolytica* in the late telophase stage of mitotic division is described. This organism was identified in a stained preparation obtained from an experimental infection in a dog, and appears to have certain characteristics not previously described."

Atias, A., Reid, A. & Ubilla, V. Amibiasis mortal por diseminación. [**Fatal Disseminated Amoebiasis**] *Bol. Chileno de Parasit.* 1957, Oct.–Dec., v. 12, No. 4, 72–4, 1 fig.

The English summary appended to the paper is as follows:—

"The authors describe the rapid clinical course of a fatal case of amebiasis and the autopsy findings, namely a giant hepatic abscess and many small hepatic, pulmonary and cerebral abscess, with *Entamoeba histolytica* confirmed in all of them."

Welchman, J. M. **The Cardiac Toxicity of Emetine.** *J. Trop. Med. & Hyg.* 1957, Dec., v. 60, No. 12, 296–302, 2 figs. [25 refs.]

The author, in London, studied 15 patients undergoing treatment for intestinal amoebiasis at the Hospital for Tropical Diseases. Only one of them probably had hepatic involvement; this man alone was given emetine hydrochloride. Then both he and the others were treated for their intestinal infections with emetine bismuth iodide, the total dosage of this drug ranging from 24·0 mgm. to 40·3 mgm. per kgm. of body

weight. Electrocardiograms in all cases were taken before treatment, at intervals of 1 to 4 days during it, and immediately after the completion of treatment. In 3 cases they were repeated 4 weeks later.

The author gives the following summary:—

"(i) Out of 14 cases of amoebiasis treated with emetine bismuth iodide in therapeutic dosage, none showed changes in the electrocardiogram which could be ascribed to the treatment.

"(ii) One case receiving both emetine hydrochloride and emetine bismuth iodide showed changes in the electrocardiogram which were probably due to the treatment.

"(iii) Electrocardiographic changes are discussed and it is submitted that the high incidences described in some series of cases are not at all in fact due to emetine and account must be taken of this in the assessment of the significance of these incidences.

"(iv) Where E.C.G. changes do occur they are usually in the T wave only; caution must be observed in their acceptance as being indicative of pathological change unless present in more than one lead or accompanied by other changes.

"(v) The literature is reviewed and it is considered unjustified that emetine and emetine bismuth iodide should be regarded as sufficiently dangerous in therapeutic dosage to withhold them in the treatment of amoebiasis." *A. R. D. Adams*

Haworth, R. D. & Michael, M. **The Constitution of Conessine. Part X. Oxidation of Conessine and Pyrolysis of some Oxidation Products.** *J. Chem. Soc.* 1957, Dec., 4973–83. [Refs. in footnotes.]

Schneider, J., Dupoux, R. & Montezin, G. Traitement de l'amibiase intestinale par le diphétarsone-spiramycine (6.753 RP.). [**Treatment of Intestinal Amoebiasis with Diphetarsone and Spiramycin**] *Bull. Soc. Path. Exot.* 1957, July–Aug., v. 50, No. 4, 600–606. [10 refs.]

The chemotherapy of amoebiasis has progressed along 2 lines: firstly by the introduction of new preparations in the series of iodoquinolines and arsenicals which exert a direct action on the parasites; secondly by the use of antibiotics which may or may not themselves be amoebicidal, but which exert considerable action on the bacterial flora associated with the amoebae. Possible unfortunate risks of the use of the wide spectrum antibiotics, such as those of the tetracycline group, are the massive destruction of all the Gram positive and Gram negative intestinal flora and also the danger of the engenderment of strains of bacteria resistant to the antibiotic, for example of staphylococci and monilias, which may result in grave and even fatal complications.

The introduction of newer antibiotics which do not affect the coliform Gram negative organisms, but only the Gram positive anaerobes, and staphylococci, enterococci and streptococci found in the large intestine, is of considerable importance in this connexion. For some years the authors have used spiramycin (Rovamycin) [this *Bulletin*, 1956, v. 53, 1426] to this end; both they and other French workers have found it eminently satisfactory. Spiramycin is not itself amoebicidal but, though having no action on the Gram negative coliform organisms, it is consistently effective against the Gram positive organisms especially the anaerobic *Clostridium welchii*. There is no massive destruction of the intestinal flora by it, and the serious consequences following such an eradication therefore are avoided. A combination of 33·8% of the acid diphetarsone (Bemarsal) and 66·2% of the spiramycin base is stable and is soluble in water; it can be put up as tablets each weighing 0·5 gm. After toxic and therapeutic tests of the components, alone and in combination, on rats this preparation was used for the treatment of human amoebiasis in series of cases in Paris and in Tunis. The dosage was 4 to 6 tablets (2 to 3 gm.) daily for 10 consecutive days for adults. Of the 20 patients so treated in Paris 19 were rapidly relieved of the symptoms and signs from which all had suffered. Of the 17 similar cases in Tunis there was a like result from the treatment. In all instances the compound was very well tolerated. In the authors' opinion this drug combination marks a new stage in the treatment of amoebiasis and its sequelae, in that a small dose exerts an effective double action on the parasite and its immediately associated bacterial flora, and is devoid of the dangers attaching to the use of the wider spectrum antibiotics.

A. R. D. Adams

Young, M. D. & Freed, J. E. **The Suppressive and Prophylactic Effects of Puromycin against Intestinal Protozoa.** *Amer. J. Trop. Med. & Hyg.* 1957, Sept., v. 6, No. 5, 808–12.

The authors have stated that puromycin (Stylomycin) when given for 4 days eradicates all intestinal protozoa from the human intestine [this *Bulletin*, 1956, v. 53, 1118]. Working among adult female patients in a mental hospital they devised experiments to test the suppressive and prophylactic effects of puromycin when given daily or weekly, to test its prophylactic effect when given in weekly dosage after therapeutic removal of the intestinal protozoal fauna, and to ascertain the rate of acquisition of infections with these organisms after their removal, or after chemotherapeutic prophylaxis was discontinued. A selection of patients was retained as a control group, and as a source of infection to the others. The total number of patients involved was about 160. The protozoa involved were *Entamoeba histolytica* and *E. coli*, *Iodamoeba*, *Endolimax*, *Chilomastix*, *Trichomonas* and *Giardia*.

The relevant data are set out in a number of tables. The authors give the following summary:—

"The suppressive and prophylactic action of puromycin was tested on patients of a mental hospital who were exposed to a high rate of infection with intestinal protozoa. In an exposed group of cases receiving 100 mgm. of the drug daily for 10 days, about half the amebic infections were cured and most of the rest were suppressed. Weekly administration of as much as 500 mgm. for 5 weeks effected few cures and failed to prevent new infections.

"A group of patients on a heavily infected ward were then cleared of protozoa with one gram of puromycin daily for 4 days, and about half of these were continued on a prophylactic regimen of 250 mgm. thrice weekly for 6 weeks. The unprotected group began to acquire infections during the 4th week after cessation of treatment, while the rest remained uninfected throughout the 6 weeks of prophylaxis, although constantly exposed. Two weeks after prophylaxis was discontinued, this group also began to acquire infections.

"All the patients receiving one gram daily had diarrhea on the 4th day and a few vomited, but these reactions disappeared on reducing or withdrawing the drug. The lower dosages did not produce side reactions."

A. R. D. Adams

Lynch, J. E. **Histological Observations on the Influence of a Special Diet used in Experimental Amebiasis in Guinea Pigs.** *Amer. J. Trop. Med. & Hyg.* 1957, Sept., v. 6, No. 5, 813–19, 4 figs. [10 refs.]

It is now well established that the host diet affects the nature of experimental infection with *Entamoeba histolytica* and other parasites [this *Bulletin*, 1935, v. 32, 777; 1936, v. 33, 528; 1951, v. 48, 1112; 1952, v. 49, 1122; 1956, v. 53, 445]. The effect of diet also became apparent to the present author during the screening of anti-amoebic agents in guineapigs. The degree of infection was enhanced when they were kept on a synthetic diet compared with the infection obtained with a standard laboratory diet. An attempt has been made to study the rationale of this change in the nature of the infection. Animals were fed on the two diets in the absence of infection and the changes in their caecal mucosa were studied. Different types of bacteria were also added to the standard diet and the effect on the nature of a subsequent infection with *E. histolytica* was observed. By this latter method the nature of the infection remained practically unaltered. Differences were, however, evident in the appearance of the caecal mucosa of guineapigs fed on the two diets, the tissue being thinner and more vacuolated when the synthetic diet was used. The necessity for a special diet in producing the fulminating infection is emphasized and may be related to the mucosal changes observed.

J. D. Fulton

VAN DER HOEVEN, J. A. & RIJPSTRA, A. C. **Intestinal Parasites in the Central Mountain District of Netherlands New-Guinea. An Important Focus of** *Balantidium coli*. *Documenta Med. Geograph. et Trop.* Amsterdam. 1957, Sept., v. 9, No. 3, 225–8, 5 figs.

A small faecal survey was carried out on 98 persons living in the Central Mountain District of Dutch New Guinea. 20% showed *Balantidium coli* (half were accompanied by cysts); 100% of pigs' faeces from the same locality showed the infection also. 13% of the people were infected with *Entamoeba histolytica* but amoebic dysentery was rare among them. The balantidial infections were always accompanied by the presence of mucus in the stools. A single infection with *Isospora hominis* was also encountered. Common helminthic infections were frequently found. *P. C. C. Garnham*

YAWS AND OTHER TREPONEMATOSES

FAWKES, M. A. **A Short History of Yaws in Trinidad.** *West Indian Med. J.* 1957, Sept., v. 6, No. 3, 189–204, 3 figs.

After a brief description of Trinidad, which in mid-1953 had an estimated population of 678,300, it is pointed out that yaws must have been repeatedly introduced by African slaves. It appears that it was under quite good control by segregation until the emancipation in the early 19th century, after which the freed slaves and the disease were widely dispersed. Later the prevalence of yaws greatly increased. A government medical service was established in 1875, but much yaws remained on the island.

A yaws ordinance in 1896 provided for compulsory notification, compulsory treatment, special yaws officers to search for cases and the establishment of yaws dispensaries and hospitals; the notification was not enforced. In 1896 in more than 20 dispensaries 705 yaws patients were treated and in 1900 there were 1,403 yaws patients in a total population of a quarter of a million. An outbreak of yaws in an orphanage died out in 5 years after segregation of active cases. After this, segregation was adopted as a policy until 1920, during which period an annual average of 1,027 yaws patients were treated. Among a number of interesting observations noted were: that a milder type of disease appeared within a few years of the introduction of organized treatment facilities, that the dispensary system reduced the prevalence but did not eradicate yaws, and that the introduction of any new and supposedly more successful treatment was followed by an unexpectedly large number of cases. Most (70%) of the patients treated were under 15 years of age, with the greatest number (33%) in the 6–10-years age-group. Neoarsphenamine

was first tried in January 1910 but continuous adequate supplies were not available until 1917.

In 1920, because neoarsphenamine was regarded as so effective, the last and largest yaws hospital (200 beds) was closed and treatment of yaws patients was made the responsibility of the District Medical Officers in dispensaries and hospitals. Sodium bismuth tartrate (Sobita) was tried in 1924 but was abandoned in 1929 because of the frequency of relapses that followed its use.

In 1937 a full-time Venereal Diseases Officer was appointed who was in charge of anti-syphilis and anti-yaws measures. Serological tests for syphilis were often reactive in persons who probably had yaws in childhood. However, a few cases of syphilis were found in " each of the rural areas visited ".

In 1944 the Caribbean Medical Centre was established, initially as an activity of the Anglo-American Caribbean Commission. More active anti-yaws measures were undertaken in 9 field clinics visited weekly by mobile teams, each in charge of a doctor. Attendance at the clinics was voluntary. An investigation at the central clinic showed that of 8,069 yaws cases 55·2 were serologically latent.

In 1946 a separate Yaws Control Unit was formed. The population was informed about the anti-yaws work and voluntary attendance at clinics continued but more serological work was done. An intensive campaign in each area lasted 4–6 weeks. It was found that a large proportion of the population, as counted by house-to-house visits, attended. Early cases were given penicillin, and late and late latent cases received arsenic and bismuth. From 1947 to 1953, 1,542 yaws patients were treated, representing 13·4% of those attending the clinics.

It is concluded that to eradicate yaws from Trinidad, in addition to other measures, house-to-house surveys for diagnosis and treatment with a single injection of a repository penicillin preparation will be needed. It is also important to raise the general levels of hygiene and responsibility and for the people themselves to recognize early yaws and insist on its early adequate treatment, " and that the contacts of such cases are carefully observed ". The central control organization should continue as an advisory and supervisory service to ensure maintenance and continuity of effort.

[This is an interesting paper which contains many lessons for those responsible for yaws eradication campaigns. After effective chemotherapy became available in Trinidad more success might have resulted if some attempt had been made to treat " latent cases and contacts ". Annual resurveys are necessary until the prevalence of active yaws is low and the rural health service can continue the surveillance that is essential to achieve eradication. See this *Bulletin*, 1957, v. 54, 689.]

C. J. Hackett

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Souza Campos, N., Rosemberg, J. & Aun, J. N. **Significance of the Relationship between the Lepromin and Tuberculin Reactions in Leprosy Contacts. Leprosy Infection; Leprosy Disease; Primary Complex.** *Internat. J. Leprosy.* New Orleans. 1957, Jan.–Mar., v. 25, No. 1, 38–48.

A study was made of young children in 2 preventoria for the children of leprous parents, who had all been in contact with leprosy. They are divided into 7 different categories according to whether or not their lepromin and tuberculin reactions were positive, and whether or not they had had contact with leprosy and tuberculosis. Those with lepromin-negative and tuberculin-positive reactions are considered to be in the most perilous condition as regards developing serious leprosy, and they should receive a priority of attention. "When tuberculous infection precedes leprosy contagion it induces, in the great majority of cases, a state of resistance to leprosy. But when the reverse order of events occurs, which happens frequently, the organism becomes more susceptible to tuberculous infection, as is shown by the high index of tuberculin hypersensitivity in lepromatous leprosy cases." A distinction is made between "leprosy infection" and "leprosy disease", the former being found in persons who have been in contact with leprosy but have a positive lepromin reaction, whether or not they are apparently healthy or have tuberculoid lesions; while the latter is found in those in whom resistance is lacking as is shown by a negative lepromin reaction, whether they are apparently healthy or have lesions of the indeterminate or lepromatous type.

This study demonstrates that the incidence of leprosy among close contacts is much higher than is indicated by the epidemiological data.

Ernest Muir

Doull, J. A., Guinto, R. S. & Mabalay, M. C. **Effect of BCG Vaccination, Lepromin Testing and Natural Causes in inducing Reactivity to Lepromin and to Tuberculin.** *Internat. J. Leprosy.* New Orleans. 1957, Jan.–Mar., v. 25, No. 1, 13–37, 2 figs. [17 refs.]

It is accepted that the lepromin reaction becomes positive in a certain number of those who have never been in contact with leprosy. Experiments were undertaken to determine the factors leading to this reactivity. The island of Mactan in the Philippines was chosen because of its comparative isolation and because it had been the site of epidemiological studies since 1933.

The subjects were 550 apparently healthy children, 6 to 35 months old,

with no known contact with leprosy. Of these, 483 remained in the study. Of the 483 about one-fifth (87) were used as basic controls and were given only a tuberculin test. Of the rest those found negative to lepromin and tuberculin (300) were divided into 4 subgroups and given respectively: fresh BCG, lyophilized BCG, diphtheria toxoid, and saline. From 90 to 100 days later, some 143 days after the initial tests, all the children were tested with lepromin and PPD-S 0·0001 mgm. with the following results. The groups with the two kinds of BCG were practically the same; those with toxoid and those with saline were practically the same; of the BCG groups the percentage of negatives becoming reactive was 71·2 for Mitsuda, 32·7 for Fernandez and 59 for PPD-S; in the toxoid and saline groups the conversions of the corresponding reactions were 27·1, 10·6 and 6·9%, respectively. The reactions in the toxoid-saline controls are accounted for by the effects of the initial lepromin test and natural (unknown) causes. When these are subtracted from the BCG results, BCG is credited with percentages for Mitsuda 44·1, for Fernandez 22·1 and for PPD-S 52·1.

The effect of the different factors is discussed at great length.

It is concluded that increase of reactivity to lepromin in persons vaccinated with BCG cannot be attributed to vaccination alone, but is also contributed to by natural causes and probably by the lepromin test itself, though in the present study the latter is suggestive only. The increase of reactivity to lepromin in the toxoid-saline groups could not have been due to infection with tuberculosis, as only 2·3% of the 483 children reacted to PPD-S at the outset of the experiment. *Ernest Muir*

Chatterjee, K. R., Das Gupta, B., Ray, H. N. & Mukherjee, N. **Detection of Calcium in the Skin Lesions of Lepromatous Cases of Leprosy by Histochemical Technique.** *Internat. J. Leprosy.* New Orleans. 1957, Jan.–Mar., v. 25, No. 1, 49–50, 4 figs. on pl.

Frozen sections taken from lepromatous lesions were stained with nuclear fast red. The histiocytes and foamy macrophages took up this stain very strongly, producing a brilliant red precipitate in and around these cells, while the rest of the tissue scarcely responded at all. In other similar sections, after the removal of soluble calcium salt with citrate buffer solution, staining by von Kossa's method gave a faintly positive reaction to the silver method, indicating the presence of calcium carbonate or phosphate. Bunting's method showed negative for carbonate, but the tissue reacted positively for phosphate. There thus appears to be calcium in soluble and insoluble forms, the latter in combination with a phosphate radicle. It was noticed that the areas containing intracellular lipoid as shown by Sudan black showed strong affinity for the nuclear fast red. It was therefore concluded that calcium phosphate and lipoid occurred in these histiocytes and macrophages as loosely-bound calcium-phosphate-lipoid complex. *Ernest Muir*

Laviron, P., Lauret, L., Kerbastard, P. & Jardin, C. Le traitement de la lèpre par injections mensuelles de D.D.S. [**The Treatment of Leprosy with Monthly Injections of DDS**] *Méd. Trop.* Marseilles. 1957, Nov.–Dec., v. 17, No. 6, 795–808, 2 graphs & 6 figs. [10 refs.]

The authors tested three methods of administering DDS in suspension at monthly intervals, the suspension being injected intramuscularly. The first was a suspension of 2·5 gm. in chaulmoogra oil and esters, the second a suspension of 2 gm. in agar, and the third a suspension of up to 1·5 gm. of large-grained DDS in agar solution. It was found that blood concentration lasted in a diminishing degree up to 30 days. In all, 107 patients were treated. While good results were obtained with all three suspensions, it was felt that the minimum monthly dose aimed at should be at least 2 gm. The authors consider that this form of treatment is particularly acceptable to patients because of the prolonged duration necessary. It is also very suitable for carrying on after-treatment when all signs of the disease have disappeared. Side effects were absent or only very slight.

[See also this *Bulletin*, 1955, v. 52, 1098.] *Ernest Muir*

Laviron, P., Lauret, L., Kerbastard, P., Jardin, C. & Pfister, R. Les injections hebdomadaires de thioacétazone en suspension chaulmoogrique dans le traitement de la lèpre. [**Weekly Injections of Thiacetazone in a Chaulmoogra Suspension in the Treatment of Leprosy**] *Méd. Trop.* Marseilles. 1957, Nov.–Dec., v. 17, No. 6, 809–14, 2 figs. [12 refs.]

Thiacetazone (TB-1), suspended in a mixture of chaulmoogra oil and esters, in a weekly dose of 750 mgm., was found to retain a blood concentration of 0·5 to 2·4 mgm. per litre on the 7th day after intramuscular injection. With this dose the patients failed to develop agranulocytosis and other side effects reported by other workers.

After treatment of 46 patients the authors got results comparable with those given by sulphones. It is useful where there is intolerance or resistance to sulphones, but thiacetazone costs 3 times as much as DDS and therefore cannot take the place of the latter as the treatment of choice in leprosy.

[See also this *Bulletin*, 1954, v. 51, 805.] *Ernest Muir*

Poddar, R. K. & Chatterjee, K. R. **Autoradiographic Detection of Sulphone in the Affected Tissues of Leprosy Patients.** [Correspondence.] *Nature*. 1957, Oct. 26, v. 180, 854–5, 3 figs.

In previous experiments [this *Bulletin*, 1957, v. 54, 176, 702] the authors had shown by assay of DDS labelled with ^{35}S, that the drug was preferentially concentrated in the affected tissues of leprosy patients.

They have now made autoradiographic studies to determine the exact site of localization of the drug in the tissues affected.

Patients were given a single oral dose of ^{35}S (4 μc./kgm. body weight); the initial specific activity of the drug was 1·0 μc./mgm. After 6–18 hours, tissue biopsies were taken and fixed in formalin for frozen sections. Sections (5 μ) on a slide were covered with autoradiographic stripping film and exposed for 180 days in dry light- and air-tight chambers at 4°C. The films were developed in undiluted *D* 19b for 5 minutes at 65°F. to keep the background as low as possible.

Positive autoradiographs are shown in 3 figures. One of these shows the drug (indicated by blackened photographic grains) in the transverse section of a blood-vessel; the other two are autoradiographs of longitudinal and transverse sections of peripheral nerves; the density of the grains is more marked where infiltrating cells are predominant and the space between adjacent fibrils is seen to be almost free of drug. The figure of the transverse section shows that the drug is more localized within the different cells of the nerves. *H. J. O'D. Burke-Gaffney*

Caver, C. V. **Treatment of Trophic Ulcers of Leprosy with Roniacol.** *Internat. J. Leprosy.* New Orleans. 1957, Jan.–Mar., v. 25, No. 1, 9–12.

Considering that narrowing of blood-vessels due to outside pressure was a possible cause of delay in the healing of ulcers of the foot in leprosy, the author tried the effect of Roniacol tartrate (a beta-pyridyl carbinol) as a vasodilator. A "double-blind" experiment was planned, neither the physician nor the patient knowing which of 4 patients was on the drug and which on a placebo. Although one of the patients "showed a definite advantage over previous episodes of bed rest and curettement", no definitely conclusive results were obtained. The drug was given in a dosage of 50 mgm. thrice daily. *Ernest Muir*

Fritschi, E. P. & Brand, P. W. **The Place of Reconstructive Surgery in the Prevention of Foot Ulceration in Leprosy.** *Internat. J. Leprosy.* New Orleans. 1957, Jan.–Mar., v. 25, No. 1, 1–8, 2 text figs. & 8 figs. on 2 pls. [21 refs.]

The aetiological factors involved in ulceration of the foot in leprosy are discussed. These are mainly paralytic, the 2 nerves chiefly involved being the lateral popliteal and the lateral and medial plantar branches of the posterior tibial. The lesion of the lateral popliteal is generally 3 or 4 inches proximal to where it crosses the neck of the fibula. If the entire nerve is affected there is drop-foot with loss of dorsiflexion and of eversion. Excessive inversion may lead to ulceration of the outer edge

of the foot. Three possible operations for this condition are mentioned, the usual one being the transplantation of the tibialis posterior tendon to the dorsum of the foot. But if the musculo-cutaneous branch of the lateral popliteal nerve is not affected, the healthy peroneal muscle tendons are also used.

When the posterior tibial nerve is involved the lesion is generally just proximal to the laciniate ligament on the medial side of the ankle, where the nerve lies superficially. This lesion results in the paralysis of all the small muscles of the foot, followed ultimately by claw-toe deformity. This is followed by undue pressure on the heads of the metatarsals, ulceration of the covering soft tissues, and later bone destruction. Claw toe may be remedied by transplantation of the flexor digitorum longus tendon.

Other important measures in preventing and healing ulcers of the foot are the use of specially moulded shoes and instruction of the patient in foot hygiene, so as to reduce walking and standing to a minimum.

Ernest Muir

DE SOUZA ARAUJO, H. C. Eficácia da vitamina "E" nas amiotrofias leprosas. [**Efficacy of the Vitamin "E" in Amyotrophies of Leprosy**] *Rev. Brasileira Med.* Rio de Janeiro. 1957, Aug., v. 14. No. 8, 551–2. English summary (7 lines).

An account of 8 cases. Complete or partial functional recovery is recorded.

BERGEL, M. Inoculación del *Mycobacterium leprae* a ratas alimentadas con dietas prooxidantes. II. Resultados bacteriológicos hasta los diez meses de la primera reinoculación. [**Inoculation of *Mycobacterium leprae* in Rats fed on a Prooxidant Diet. II. Bacteriological Results up to Ten Months after the First Reinoculation**] *Semana Méd.* 1957, Dec. 5, v. 111, No. 23, 1148–50, 1180, 7 figs.

This is in continuation of a previous report by the same author [this *Bulletin*, 1958, v. 55, 172] on the results obtained by inoculating with *Myco. leprae* rats fed on prooxidant diet. In the previous experiment it was found at the 7th month after inoculation that the bacilli had multiplied in large numbers, in contrast to the controls which were on ordinary diet. Material was taken from one of the originally inoculated rats, which died at 7 months, and inoculated in the form of a suspension into 8 more rats (fed similarly on diet low in vitamin E and with linseed oil) intraperitoneally, subcutaneously and intratesticularly. Of these 8 rats those that died or were killed before 7 months showed nothing of interest. In one killed at 7 months there were signs of multiplication of bacilli in the inoculated testicle. In one killed at 10 and another at 11 months

there was massive infection with acid-fast bacilli in the inoculated testicle, bacilli being both inside and outside the cells. In the latter of these 2 rats there were also abundant bacilli in the uninoculated testicle.

To establish the claim that bacilli have been successfully inoculated in animals, the author is taking bacilliferous material from these rats and inoculating it into a third series. He believes that this is the first time that the most important postulate of Koch has been fulfilled in transmitting the leprosy bacillus to animals. *Ernest Muir*

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—Trematodes (*schistosomes, other flukes*); Cestodes (*Diphyllobothrium, Taenia, Echinococcus, other cestodes*); Nematodes (*Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.*).

Králová, E. & Šafránek, V. Helminthologický průzkum u sedimentů z čistírny odpadních vod v Kuřimi. [**Helminthological Investigation of Sediments from the Waste Water Refining Station at Kuřim**] *Československ. Hyg.* Prague. 1957, v. 2, No. 7, 399–404.

The English summary appended to the paper is as follows:—

"1. By investigation of sediments from the refining station at Kuřim we have found the eggs of human helminths, thus proving the parasitical infestation among the inhabitants of this waste water region. The investigation of sediments has been done once in a month during a period of one year, according to the Vasilkova's method, applied for investigation of soil. The helminthological material, obtained in this way, was cultivated in damp incubators, in order to ascertain the vitality of eggs.

"2. In maximum 86 eggs of parasitic worms in 100 grams of sample have been found in a putrid sediment; from them Ascarides have been the most numerous present, Trichuris less, and Enterobius scanty. In a fresh sediment, 28 eggs of parasites have been found in maximum; Ascaris in majority again, Trichuris and Enterobius in an equal amount. The egg of Hymenolepis nana once only has been found. By evaluation of the vitality of eggs we have found almost 100% of living eggs in the sediment, 17·1% up to 58·3% in the putrid one.

"3. In the waste water refining station under investigation the putrefaction processes are proceeding at the psychrophilic temperatures. It is evident from the results of our investigation that this procedure for disposal may not be regarded as sufficient."

Lee, C. L. & Lewert, R. M. **Studies on the Presence of Mucopolysaccharidase in Penetrating Helminth Larvae.** *J. Infect. Dis.* 1957, Nov.–Dec., v. 101, No. 3, 287–94, 2 figs. [18 refs.]

McCullough, F. S. **A Preliminary Note on the Degree of Compatibility between *Schistosoma haematobium* and its Bulinid Vectors.** *West African Med. J.* 1957, Sept., v. 6 (n.s.), No. 3, 98–100. [11 refs.]

In Ghana, *S. haematobium* is transmitted by two different kinds of snails, (a) *Bulinus* (*Physopsis*) *globosus* which is the most important vector and (b) *Bulinus* (*Bulinus*) *truncatus*. In the Ke district, near Accra, only *B.* (*B.*) *truncatus* occurs while in the Pokoasi district, also near Accra, only *B.* (*P.*) *globosus* is found. Each kind of snail is a good vector of *S. haematobium* in its respective district. But experiments showed that *B.* (*B.*) *truncatus* (of Ke) was refractory to infection with *S. haematobium* from Pokoasi and conversely *B.* (*P.*) *globosus* (of Pokoasi) was refractory to the infection with *S. haematobium* from Ke. It appears therefore that there are two strains of *S. haematobium* in Ghana, and " that each strain is highly specific for snails belonging either to the subgenus *Bulinus* or to the subgenus *Physopsis*. On the basis of this finding an explanation of some of the anomalous results described by other workers in Africa can be made and a broad concept of the vector-parasite relationship throughout much of the African continent can be foreshadowed ".

The author quotes a number of results obtained by various workers in Africa during the past 10 years, which point to the existence of different strains of *S. haematobium* and at the same time underline the complexity of the vector-parasite relationship and the present lack of comprehension of the problem. " In brief, there is now urgent need to conduct, in the broadest sense, experimental transmission studies, employing standard techniques, in order to determine the degree of compatibility between bulinid snails and known strains of the parasites from local as well as from other regions in Africa."

[See also this *Bulletin*, 1958, v. 55, 176.] *J. J. C. Buckley*

Beck, J. W. & Garrett, F. D. **A Preliminary Report on a Perfusion Technique for recovering Schistosomes at Time of Autopsy.** *Amer. J. Trop. Med. & Hyg.* 1957, Sept., v. 6, No. 5, 914–19, 2 figs.

A technique is described for perfusing the different portions of the portal system in the human cadaver so as to wash out schistosomes. The apparatus required is simple but the actual placing of the various cannulae and ligatures requires precise anatomical directions for which the original should be consulted. This technique is expected to yield information about the distribution and total number of schistosomes in the human body. *F. Hawking*

Gelfand, M. **Cor-Pulmonale and Cardio-Pulmonary Schistosomiasis.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Nov., v. 51, No. 6, 533–40, 3 figs. [11 refs.]

Right ventricular failure due to schistosomal pulmonary endarteritis was first recorded by Bey [*J. Egyptian Med. Ass.*, 1932, v. 15, 87]; subsequently it has been reported by many others, notably Shaw and Ghareeb [this *Bulletin*, 1938, v. 35, 665] who studied its pathology and aetiology in detail. This is a report of 3 African patients suffering from cor pulmonale and seen by the author in Salisbury African Hospital, Rhodesia. In this area schistosomiasis is endemic, and chronic cor pulmonale is not uncommon in Africans. All these 3 patients died of right heart failure; all 3 had proven schistosomiasis. Only one of the 3 at autopsy was found to have schistosomal tubercles in the lung alveoli and ova impacted in the pulmonary arterioles causing arteriolitis consistent with a diagnosis of schistosomal cor pulmonale. The lungs of the other 2 showed no evidence of schistosomal infection on histological examination, or after digestion in caustic potash. In these 2 patients, therefore, although the clinical picture was identical with that of the first case the cause of the lung lesions was not their schistosomal infections. In an area where schistosomiasis is endemic cor pulmonale due to causes other than this worm infection may be encountered, and therefore it may be argued that pulmonary schistosomiasis when seen in such cases is incidental to, and not the cause of, the cor pulmonale. In an endemic area, therefore, even if ova are found in the excreta of a patient with cor pulmonale caution should be exercised before ascribing the latter to the schistosomal infection. *A. R. D. Adams*

Salvador, Hospital Naval Do [Guerra, W. de A., Director]. Simpósio sôbre esquistossomose. [**Symposium on Schistosomiasis**] 312 pp. 1957.

This symposium, which was held in Salvador, Brazil, covered a very wide range of problems on *Schistosoma mansoni* schistosomiasis. It took the form of questions and answers, and readers of this *Bulletin* will recognize among the many participants the familiar names of distinguished Brazilian experts on this subject.

The symposium was preceded by a number of addresses and a valuable introductory review of the present and future position of schistosomiasis control in Brazil by Dr. Mario Pinotti, Director General of the National Department of Rural Endemic Disease.

There were 6 scientific sessions and the number of items discussed was over 300. The answers to each problem varied from a few lines to several pages and covered biology, pathology, clinical features, treatment and prevention. There was special emphasis on splenomegaly and the circulatory changes in the hepato-splenic form of the disease.

The printed proceedings contain a vast amount of information on many aspects of mansonian schistosomiasis and should prove of great value to Portuguese readers, especially those working in Brazil.

H. J. O'D. Burke-Gaffney

Falcão, E. de C. **Novas achegas ao estudo da determinação da especificidade do " Schistosomum mansoni ".** [Further Data relating to the Study of the Determination of the Specificity of *Schistosoma mansoni*]

This book was reviewed on p. 350.

Goodwin, L. G., Richards, W. H. G. & Udall, V. **The Toxicity of Diaminodiphenoxyalkanes.** *Brit. J. Pharmacol. & Chemotherapy.* 1957, Dec., v. 12, No. 4, 468–74, 6 figs.

The diphenyloxyalkane compounds $R.C_6H_4.O.(CH_2)_nO.C_6H_4.R$ (where R is a substituted amine or similar group) are interesting because they are active in curing experimental schistosomiasis in animals [this *Bulletin*, 1957, v. 54, 313 *bis*]; their application to the treatment of human schistosomiasis was handicapped by their toxic action on the retina. Much work has been undertaken in the hope of obtaining their activity without their toxic effects. The present investigations were concerned with the toxic effects. In mice large doses caused convulsions, or paralysis of the hind limbs (according to chemical structure). The red blood cells decreased to half their number. Two weeks after treatment, mice (but not other animals), lost their hair over large patches of skin, apparently owing to a destructive action on developing hair follicles. Diuresis was inhibited. The eyes of mice, rats or guineapigs were not affected by the drugs, but in cats degeneration of the retina and blindness were caused. In frogs, the resynthesis of rhodopsin in the retina (after it had been bleached by light) was prevented by the compounds; and this provided a convenient technique for investigating the phenomenon. The distribution of these various toxic actions among the various compounds studied was not proportional to their action on schistosomes.

[For the relation between chemical structure and toxic action the original should be consulted.] *F. Hawking*

Hsü, H. F. & Li, S. Y. **Studies on Schistosomiasis japonica in Formosa. IV. Wild Rats and other Small Mammals as Reservoir Hosts of *Schistosoma japonicum* in Formosa.** Reprinted from *Ann. Acad. Sinica.* Taipei. 1955, No. 2, Pt. 1, 147–55.

1,557 small mammals, trapped in the Changhua *Hsien* area of Formosa [this *Bulletin*, 1952, v. 49, 878] were examined for *Schistosoma japonicum*

infection. The animals comprised 9 different species, 7 rodents and 2 insectivores, of which the shrew, *Crocidura murina*, is the most common as it constitutes 77·1% of those trapped. It is reported for the first time as a host of *S. japonicum* which was found, as adult worms, in 18·6% of them. Of these, 34% showed eggs in the faeces. *C. murina* is regarded as one of the most important disseminators of *S. japonicum* in the area. 4 rodents, *Rattus rattus*, *R. norvegicus*, *R. losea* and *Mus formosanus* were also found naturally infected, *M. formosanus* for the first time. The incidence of the infection in these 4 rodents varied from 8·6 to 21·5%, of which 10–28% of infected animals showed eggs in the faeces. These are not very numerous and the animals are regarded as less important than *C. murina* in the role of reservoir hosts. *J. J. C. Buckley*

Liang, Yu-I, Shen, Mai-Ling, Chen, En-Hung & Ting, Kuan-Sheng. [**Studies on Antibilharzial Drugs. X. Influences of Sodium Dimercaptosuccinate on the Distribution, Excretion and Therapeutic Activity of Tartar Emetic in Rabbits**] Reprinted from *Acta Physiologica Sinica*. 1957, Sept., v. 21, No. 3, 235–43. [26 refs.] [In Chinese.] English summary.

Diaconita, G. & Nagy, P. **Contributions to the Study of Intrarachidian Localisation of Distoma (Paragonimiasis).** *Acta Med. Scandinavica*. 1957, Nov. 15, v. 159, No. 2, 151–4, 4 figs. on 2 pls.

At a hospital in Korea a patient with a paraplegia was found at operation to have epidural granulation tissue in the lower dorsal region, which contained helminth eggs. No lesions were found in the lungs by X-ray examination, and, because of this, the sputum was not examined for eggs. *W. E. Kershaw*

Diaconita, G., Goldis, G. & Nagy, P. **Researches on Histogenesis and Anatomico-Pathological Forms of Cerebral Distomatosis (Paragonimiasis).** *Acta Med. Scandinavica*. 1957, Nov. 15, v. 159, No. 2, 155–66, 9 figs. on 5 pls.

12 cases of cerebral localization of paragonimiasis are reported.

It is generally considered that extra pulmonary localizations of paragonimiasis are accidental, but the authors believe that cerebral lesions are about as frequent as pulmonary lesions and that, for practical purposes, they arise only with the pulmonary lesions. Cerebral localization occurs by metastasis of the adult parasite, of the encysted metacercaria [*sic*] or of the eggs from the pulmonary lesions. Cerebral localization has no characteristic clinical manifestations.

[These two papers are illustrated by many photomicrographs, but

impression and uncertainty in the text make it difficult to be certain that infection with other helminth parasites such as *Schistosoma japonicum* has been excluded. No evidence is adduced for the belief that cerebral localization of paragonimiasis is almost as frequent as pulmonary localization.]

W. E. Kershaw

DEFAILLAT, A. A propos d'une vingtaine de cas humains de fasciolose humaine en Limousin. **Twenty Recent Cases of Fascioliasis in Man in Corrèze (France).** *Bull. et Mém. Soc. Méd. Hôpit. de Paris* 1957, Nos. 29/30, 973–8.

GOODWIN, L. G. & STANDEN, O. D. **Piperazine and Male Fern in Expulsion of Tapeworms.** *Brit. Med. J.* 1958, Jan. 18, 199–4

8 patients in Tanganyika were treated by 2 doses separated by 4 gm of piperazine hexahydrate, followed 20 hours later by 60 gm of magnesium sulphate. All 8 passed 90–00 cm of gravid proglottids but not the heads. 24 hours later the patients were treated with 5 c.c. extract of male fern, followed 2 hours later by a saline purge and in each case the whole worm was passed. This experience suggested that the previous treatment with piperazine although ineffective in itself might have facilitated the later action of male fern. Further trials were then made in which 15 men were given piperazine 3 gm in the morning and 5 c.c. extract of male fern the next morning followed 2 hours later by 60 gm magnesium sulphate; 9 out of 15 patients passed heads of tapeworms. 14 patients were treated with male fern and a saline purge alone and 8 out of 14 passed heads. Although there was no difference between these two groups it is considered that further investigation with a different time interval between piperazine and male fern would be worth while.

A description is given of a useful technique employed to seek for the head of the tapeworm in the faeces. It requires a wire soup-strainer 6 in. (15 cm.) in diameter a tin baking-dish about 18 by 12 by 3 in. (45 by 30 by 7.5 cm.) blackened on the inside with cellulose paint and plenty of water.

"All stools were passed into bedpans and presented immediately. The contents of the bedpan were diluted with water if necessary and the bulk of the tapeworm was picked out and transferred with forceps to about 1½ in. (3·5 cm.) depth of water in the black tin. The remainder of the contents of the bedpan was strained through the soup-strainer and the retained residue washed with water and reserved. The bulk of the offensive fluid stool was thus rejected, and the parts likely to contain the head were examined in comparative comfort.

"We first scrutinized the contents of the black dish. All large pieces of worm were transferred to water in the now empty bedpan, until only the very finely segmented parts from the head-end were left. By tilting

the dish so that the water was stirred gently, it was often possible to identify the head quite quickly. The *T. saginata* scolex is rather larger than the head of a pin, is greyish, and is usually attached to a portion of unsegmented worm, ¼–1 in. (0·6–2·5 cm.) in length. The head is heavy, and is sometimes seen bouncing on the bottom of the pan, trailing the attached portion of worm. We never found a head attached to the main body of the worm.

"Whether or not a head was found in the first dish of specimens, the residue on the strainer was washed into the black dish, in several portions if voluminous. If still no head was found, the original panful of worm was re-examined in the black dish and, if still absent, the result was recorded as 'no head found'. With this method it was possible to be reasonably sure that no portion of the specimen had escaped scrutiny.

"The use of a blackened dish for examination proved invaluable, because it removed the obvious difficulty of observing the smaller fragments of worm against the white background of the bedpan."

F. Hawking

Mazzotti, L., Díaz Muñoz, A. & Briseño, Clementina. Conservación del extracto acuoso de semilla de calabaza, por medio del parahidrodibenzoato de metilo. [**Preservation of Pumpkin Seed Extract by Means of Methyl Parahydrodibenzoate**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1957, June, v. 17, No. 2, 61–4.

The English summary appended to the paper is as follows:—

"The addition of methyl parahydro-dibenzoate ('nipagin') (2 per 1000) to the extract prepared from pumpkin seeds, preserved this extract at least for a year, without alteration of its anthelmintic properties against *Taenia*."

Paul, M. & Fernando, M. **Hydatid Cysts in Ceylon.** *Ceylon Med. J.* (n.s.) 1957, Nov., v. 4, No. 2, 51–9, 7 figs.

A report of 2 cases.

Agosin, M.; von Brand, T.; Rivera, G. F.; McMahon, Patricia. **Studies on the Metabolism of *Echinococcus granulosus*. I. General Chemical Composition and Respiratory Reactions** [Agosin, von Brand, Rivera & McMahon]. *Exper. Parasit.* New York. 1957, Jan., v. 6, No. 1, 37–51, 3 figs. [39 refs.] **II. Some Observations on the Carbohydrate Metabolism of Hydatid Cyst Scolices** [Agosin] *Ibid.*, Nov., No. 6, 586–93. [23 refs.]

Gabriel, A. **Hydatid Cyst of the Liver. (Report of a Case.)** *Ceylon Med. J.* (n.s.) 1957, Nov., v. 4, No. 2, 61–4, 3 figs.

Paul, A. T. S. **Hydatid Disease of the Lungs and Liver. (Report of a Case.)** *Ceylon Med. J.* (n.s.) 1957, Nov., v. 4, No. 2, 65–8, 1 fig.

Hamman, H. de V. & Joubert, M. J. **A Review of Hydatid Disease of the Brain.** *South African Med. J.* 1957, Nov. 16, v. 31, No. 46, 1163–7, 5 figs.

The authors studied 20 cases of hydatid infection of the central nervous system. 14 patients (7 males and 7 females, 6 of whom were children) had the cysts in the brain, the other 6 had them in the spinal column. The authors found that age did not affect the manner in which the disease showed itself, but that it is commoner in the young adult; only 3 of their patients were over 23 years old and all had lived most of their lives on farms.

Operation confirmed the diagnosis of all the 14 brain infections. Of these 13 had single hydatid cysts, the average diameter of which was 7–13 cm.; all were supra-tentorial; one in the extradural space, 8 in the left hemisphere, one in the left ventricle, 3 in the right hemisphere and one in the third ventricle. Only 3 patients died, one after investigation by ventriculogram. None had demonstrable hydatid disease elsewhere in the body, but one had coughed up a hydatid 2 years earlier and one developed a hydatid in the trapezius one year after operation.

Of the patients with cerebral hydatids 10 presented with hemiplegia, 6 had focal or generalized epilepsy during the disease, 10 had headache due to raised intracranial pressure and 12 had papilloedema. Among the other symptoms of cerebral hydatid included in the clinical notes are nausea, vomiting, double vision, weakness of the limbs, difficulty of mental concentration and dizziness. The blood picture was normal. Symptoms of cysts in the spinal column included backache, pain in both legs increased by coughing, followed by weakness in both legs and difficult micturition, absence of abdominal and cremasteric reflexes, depressed sensation in the sacral dermatomes, paraplegia, spastic paresis and paralysis of both legs. For details of the results of lumbar puncture and myelography the paper itself must be consulted.

Brain infection can be strongly suspected when a young adult presents with headaches, hemiparesis, fits and papilloedema of gradual onset. Further investigation should then be restricted to angiography rather than ventriculography, in order to avoid the risk of puncturing a posteriorly-situated cyst and the dissemination of daughter cysts and consequent recurrence. Arana-Iniquez *et al.* (*Trans. 77th Ann. Meeting Amer. Neurol. Ass.*, 1952, p. 210) noted a characteristically fine, bilateral tremor, not accentuated by closing the eyes, which disappeared soon after operation, which may be toxic in origin or due to generalized pressure on the basal nuclei.

The authors find that eosinophilia, skin tests, complement-fixation reactions and plain X-ray examinations of the skull are not helpful.

Ventriculography should be avoided when there is hemiplegia or when hydatid disease is suspected, but for the diagnosis of *Cysticercus cellulosae* or *Coenurus cerebralis* ventriculography, supplemented by Myodil ventriculography, is the chief means of investigation.

Angiography is the ideal method of investigation and by it hydatid disease of the brain can be diagnosed correctly more often than not. There is usually gross displacement of the blood vessels circumscribing a regular avascular area, as shown in one of the illustrations of this paper. The tumour is surprisingly big in relation to the disability caused. Electroencephalography is not very helpful. None of the authors' patients showed an area of electric silence surrounded by delta waves as found by Foster, Castells and Gastant. More usual was diffuse abnormality throughout the brain, suggesting hydrocephalus and delta wave activity in the cyst region, surrounded by an area of delta wave activity of high voltage.

Treatment is surgical removal of the cyst without rupturing it. The authors found the method of San Julian *et al.*, which is briefly described, the easiest and most effective. The mortality and morbidity rate are low and most patients recover completely. All the patients with spinal cysts improved and 3 recovered completely. *G. Lapage*

Rausch, R. & Yamashita, J. **The Occurrence of *Echinococcus multilocularis* Leuckart, 1863, in Japan.** *Proc. Helminthological Soc. of Washington.* 1957, July, v. 24, No. 2, 128–33, 1 fig. [12 refs.]

On the Japanese island of Rebun, 1% of the people are believed to be infected with hydatid and 25 cases have been investigated clinically. Hitherto the infection has been thought to be due to *Echinococcus granulosus* but the present authors have found evidence that it is in reality due to *E. multilocularis*.

Two adult worms from a dog in Rebun were examined, and from the sacculate form of the uterus and the anterior position of the genital pore they were identified as *E. multilocularis*. Of 25 cases of alveolar hydatid disease in man in Rebun 15 have terminated fatally. The authors studied the histology of specimens of infected liver from a male patient who died of the disease at 21 years of age. "These sections were identical with those from patients from Germany and Alaska in important details. Expected differences in the degree and extent of the tissue reaction were noted, but the structure and characteristics of the larval vesicles corresponded exactly, and all demonstrated the extreme degree of proliferation of the subgerminal layer which appears to be peculiar to the growth of the larval *E. multilocularis* in man. Workers in Europe have had the impression that this larval cestode perhaps rarely produces scolices in man; however, scolices may occur much more frequently than realized,

since they may be so few as to be overlooked unless many sections are examined."

Dogs, foxes or cats could be the definitive hosts of *E. multilocularis* in Rebun; it is thought that the infection was introduced by red foxes from the Kuriles in 1925–26. The red-backed vole, *Clethrionomys rufocanus*, is thought to be the intermediate host, and this animal is susceptible to predation by domestic cats. Other small mammals on the island appear to be unimportant as intermediate hosts and the larger domesticated animals are not involved in the life cycle of *E. multilocularis* [this *Bulletin*, 1957, v. 54, 845]. *J. J. C. Buckley*

Jacob, G. F. **A Study of the Relationship between Sickling and Hookworms.** *East African Med. J.* 1957, Nov., v. 34, No. 11, 597–600, 2 charts.

It is now well established that the sickle-cell trait confers some protection against the more severe effects of *P. falciparum* malaria. A parasite which resembles *P. falciparum* in its geographical distribution is the hookworm. Hence, since high sickling rates are associated with areas in which *P. falciparum* malaria is endemic it is also broadly true that high sickling rates are associated with a high incidence of infection with hookworm. Beet examined in 1946 a village in Northern Rhodesia and found that 50% of 102 sicklers and 52% of 149 non-sicklers were infected with hookworm [this *Bulletin*, 1946, v. 43, 774]. However, the rate of *P. falciparum* malaria is the same in sicklers and in non-sicklers, and to obtain a difference one has to compare the severity of the parasitaemia rather than the proportion of the infected persons in the two groups [see Raper, *ibid.*, 1955, v. 52, 736]. The author, therefore, not only repeated Beet's observations in an area of Uganda where the hookworm rate is notoriously severe, but she also compared the haemoglobin levels of sicklers and non-sicklers in a series of out-patients with hookworm infection at Mulago Hospital in Kampala. As the measurement of the hookworm load was not practicable in a large number of people it was thought that this measurement of the haemoglobin level would be the next best index of the severity of the infection.

The investigation consisted of two parts. First, a whole village near Tororo was examined for sickling and for evidence of hookworm infection. 55% of 69 sicklers and 52% of 270 non-sicklers were found to be infected. Second, adult Baganda out-patients in whose stools hookworms had been discovered were examined for sickling and the haemoglobin level in their blood was measured. Of 47 sicklers 2, and of 265 non-sicklers 18, had hookworm anaemia. The mean haemoglobin levels were: males—sicklers 14·82 gm.%, non-sicklers 14·52 gm.%; females—sicklers 14·00 gm.%, non-sicklers 13·48 gm.%. Though the mean haemoglobin in the non-sicklers was slightly lower, the difference was not statistically significant. *H. Lehmann*

Harada, F. **Studies on Hookworm Larvae. V. Further Observations of Infective Larvae in Migration towards Vegetables.** *Japanese J. Med. Sci. & Biol.* 1957, Apr., v. 10, No. 2, 121–8. **VI. On the Behaviour of Infective Larvae living in the Compost Manure. (A Preliminary Experiment.)** *Ibid.*, 129–39, 3 figs. [11 refs.] **VII. Migratory Behaviour of Infective Larvae developed in the Seed-Bed.** *Ibid.*, 141–8, 4 figs.

V. Continuing his experiments on the migration of infective hookworm larvae (*Ancylostoma caninum*) on vegetation (young radishes grown on soil in Petri dishes) [this *Bulletin*, 1955, v. 52, 804] the author found that even in mild weather very few larvae migrated up the stems and there was a very high death rate among those that migrated. When the experiment was continued for 2 days and 2 nights the migration rate was higher but the death rate was still high, 37·3% in direct sunlight and 22·3% in light shade. It was also shown experimentally that migration of larvae was more effective when natural dewdrops were present in the stems than when the stems were treated with artificial dewdrops.

VI. Human nightsoil is often added to compost manure in rural Japan, as a source of nitrogen. The possibility that hookworm eggs in such situations might develop to infective larvae and cause human infection was investigated experimentally. As a result of the experiments, with infective larvae of *A. caninum*, the author concludes that larvae which develop in compost manure may be a source of human infection, for although larvae which migrate to the hotter parts will be killed, others migrate to the cooler peripheral regions and will survive.

VII. Another possible source of human infection by hookworm in rural Japan was investigated experimentally, *viz.*, seed-beds (tomato, cucumber, watermelon, etc.) to which human nightsoil is usually added. Two model seed-beds were constructed to which dog faeces containing *A. caninum* eggs were added. Infective larvae were recovered from the surface soil 5 days later and rapidly increased in numbers thereafter. Some survived on the surface soil for one month but tended to be replaced by Acarid ticks or free-living nematodes. Young vegetables grown in the seed-beds were invaded by the larvae which were found in large numbers on their upper parts and reached a maximum after 10 days. It is concluded that in the course of seed-bed management the danger of contracting hookworm infection is serious. *J. J. C. Buckley*

Caille, J. & Bourdin, R. Traitement de l'ankylostomiase par le tétrachloréthylène chez l'adulte et le grand enfant. [**Ankylostomiasis treated by Tetrachlorethylene in Adults and Older Children**] *Méd. Trop.* Marseilles. 1957, Nov.–Dec., v. 17, No. 6, 865–75.

These authors present the results of treatment of 43 patients with ankylostomiasis in hospital from December 1955 to July 1956 at Pointe-Noire (Middle Congo). Ankylostomiasis, besides being in itself a severe

disease, aggravates other infections and in the child it interferes with bodily and intellectual development. During weaning and in early childhood children are especially exposed to infection, and larval penetration is aided by the delicate texture of their skins. In the authors' practice 2 children of 6 months died from anaemia with counts of less than a million erythrocytes per cmm.

The gravity of this helminthiasis can be explained by blood loss, duodenitis produced by the parasites, by absorption of toxins which, it is suggested, are given off by the adult worms and by allergic reactions from the larvae. Tetrachlorethylene is an excellent form of treatment and is well tolerated. Two, three and even four, courses have been given to the same patients without any appearance of severe toxicity. In one patient especially, ascites and hydrothorax were dispersed with a single treatment, probably by return of the plasma albumin level to normal; in others anaemia, oedema and asthenia disappeared. This lack of toxicity enabled it to be exhibited in cases of jaundice.

The doses employed for adults were as follows: First course: on each of 3 consecutive days, early in the morning, 3, 4, then 5 capsules respectively of 1 cc. of tetrachlorethylene were given with intervals of 5 minutes between each capsule, followed each midday by appropriate doses of sodium sulphate. Two, three or even four courses had to be given for residual infections in doses up to 6 capsules daily. For a child of 8 years the total dose was 4 capsules, for one of 10 years, 6 capsules, for one of 12 years, 7 capsules, for one of 15 years, 6 capsules.

The final results were successful: in 32 patients with a single course (12 capsules); in 9 with two courses; in 1 with three courses; in 1 with four courses. In other words 73% were cured after one course.

Treatment was controlled by a single direct examination of the faeces, without concentration, and the cases were followed up for 7–210 days after cessation of the tetrachlorethylene courses. Details are given of the patients and their clinical features. *Philip Manson-Bahr*

Goodwin, L. G. & Standen, O. D. **Piperazine in Treatment of Hookworm Infection.** *Brit. Med. J.* 1958, Jan. 18, 135, 3 charts.

Piperazine salts are now recognized as being effective in the treatment of *Ascaris* and *Enterobius* but their action on other worms has been the subject of conflicting reports. In the present work 3 African children infected with *Ancylostoma* were studied. Egg counts were made on the faeces for several days before treatment and great fluctuations in the output of eggs was observed. 2 of the children were treated with piperazine 0·9 gm. and 1 gm. respectively 3 times daily for 7 days. The fluctuations of egg output continued but there was no permanent diminution in the counts. All 3 children were then treated with tetrachlorethylene (2 ml. for a child of 8–11 years) and the faeces became free from eggs. Clearly tetrachlorethylene was effective and piperazine was not.

The authors point out that during trials of drugs against hookworm and other helminth infections a sufficient number of daily stool examinations must be made beforehand in order to assess individual variation. Otherwise the arbitrary selection of two points of a fluctuating count may lead to false conclusions. *F. Hawking*

Browne, D. C., Contacos, P. G., Welch, G. E. & McHardy, G. **Treatment of *Strongyloides stercoralis* Infection with Intravenous Gentian Violet.** *Amer. J. Trop. Med. & Hyg.* 1957, Nov., v. 6, No. 6, 1066–7, 1 fig.

"In our studies with intravenous gentian violet for *Strongyloides stercoralis* infection in the human being, venous thrombosis occurred with each injection, whether by rapid injection or slower drip method. This, with the pain and soreness complained of by the patients, allowed completion of the 20-day treatment in only 9 of the original 15 cases. In none was the treatment effective. Although the series of patients was small, we feel that it is quite sufficient to establish the lack of therapeutic efficacy and reported innocuousness, and that this, along with complications encountered, precludes its use as a routine treatment of strongyloidiasis in the human being."

[See this *Bulletin*, 1950, v. 47, 640.]

Jayewardene, L. G. **A Study of Parasitic Infection in School Children.** *Ceylon Med. J.* (n.s.) 1957, Nov., v. 4, No. 2, 99–106, 2 figs.

"Faecal samples from urban and rural children [in Colombo, Ceylon] were examined for helminth parasites.

"The common helminth parasites were roundworm (*Ascaris lumbricoides*), hookworm (*Necator americanus*), whipworm (*Trichiurus trichiura*). The incidence of the other helminths was negligible.

"Eighteen per cent. of urban children harboured protozoan parasites.

"Roundworm seemed to be the predominant infection in urban children as shown by direct smear, but M.I.F.C. tests showed that a large percentage harboured latent infections with hookworm. In rural children, examination by Willis's method showed that hookworm was the dominant infection. The trend, however, seemed to be in favour of a rise in roundworm rates and a fall in hookworm rates—approximating the urban pattern. It is stressed that education in proper sanitary methods is the only permanent solution to the problem of helminthiasis."

Fairbairn, D. & Passey, R. F. **Occurrence and Distribution of Trehalose and Glycogen in the Eggs and Tissues of *Ascaris lumbricoides*.** *Exper. Parasit.* New York. 1957, Nov., v. 6, No. 6, 566–74. [14 refs.]

Norton, Stata & de Beer, E. J. **Investigations on the Action of Piperazine on *Ascaris lumbricoides*.** *Amer. J. Trop. Med. & Hyg.* 1957, Sept., v. 6, No. 5, 898–905, 3 figs.

Previous workers [Standen, this *Bulletin*, 1955, v. 52, 1004] had shown that piperazine slowly paralyses *Ascaris* worms. The present work was undertaken further to elucidate this paralysis. When the intact worm is exposed to piperazine *in vitro*, a gradual paralysis is produced, the time of onset being inversely proportional to the concentration of drug. Acetylcholine causes contraction of the isolated muscle wall, but this is inhibited by previous exposure to piperazine; the inhibition is rapid and comes on within 1 minute. Electrical stimulation of the muscle is blocked by quinine but not by piperazine or by tubocurarine. It is concluded that piperazine produces paralysis of *Ascaris* by blocking the neuro-muscular junction and the slow onset of this paralysis in the intact worm is due to the slow penetration of piperazine to the site of action.

Ascaris muscle also responds by contraction to nicotine, succinylcholine, and decamethonium, and the contraction caused by acetylcholine can be prevented by atropine and by tubocurarine. *F. Hawking*

Goodwin, L. G. & Standen, O. D. **Treatment of Ascariasis with Various Salts of Piperazine.** *Brit. Med. J.* 1958, Jan. 18, 131–3.

Two trials were carried out in the Gambia 1955 and 1956 to investigate whether the action of piperazine in the treatment of ascariasis was affected by the particular salt employed. The patients were schoolchildren, 5–11 years old, most of them harbouring 10 to 20 worms. After treatment the faeces were examined one week later, and if any eggs were detected in a faecal smear, the treatment was classified as a failure. In the first trial 386 children were given a single dose of 3 gm. (reckoned as piperazine). 77 were given the citrate, and 76% were cleared; 103 were given the phosphate and 76% were cleared; 92 the adipate, and 76% cleared; 58 the sebacate and 58% cleared; 56 the stearate and 86% cleared. According to these results, the citrate, phosphate and adipate were equal in efficacy; the sebacate and stearate might be slightly more effective but the groups treated were smaller and the difference was not highly significant. 28 patients were treated at a 4 gm. level with phosphate and 89% were cleared; 28 were treated with adipate and 82% were cleared. These results suggest that a 4 gm. dose clears about 10% more cases than the 3 gm. dose.

In the second trial 328 children were treated. 91 were given 4 gm. piperazine citrate as a solid, and 84% were cleared; 94 were given the same dose of citrate as fresh syrup (Antepar) and 87% were cleared; 99 were given syrup stored for 6 months at 37°C. and 88% were cleared; 44 were given syrup stored for 6 months at 50°C. and 86% were cleared. It is concluded that the citrate is equally effective however it is given and that it did not deteriorate even if kept at abnormally high temperatures

for 6 months. During these trials there were no complaints or toxic effects apart from nausea and vomiting in 2 children after swallowing the bulky soapy suspension of stearate.

Although all these different preparations of piperazine were equally effective, some were much more acceptable than others. The solid preparations were all bulky, especially the sebacate and stearate. The solid citrate and phosphate were acid but not unpleasant, the adipate and sebacate were distasteful and the stearate was soapy. Tablets were easy to secrete in the mouth and to spit out later. The syrup was pleasant and easy to give. It was readily taken by infants. The citrate in syrup is the form which is recommended for general practical use.

F. Hawking

Rogers, E. W. **Excretion of Piperazine Salts in Urine.** *Brit. Med. J.* 1958, Jan. 18, 136–7, 2 figs.

A colorimetric method with 1:2-naphthoquinone-4-sulphonic acid is given for the estimation of piperazine in urine. Although not completely specific for this substance, it is sufficiently accurate for practical purposes. [For the details, the original paper should be consulted.] Examinations were made of the urines of volunteers and of African patients receiving the different salts of piperazine—citrate, phosphate and adipate—in single doses equivalent to 3 gm. of piperazine hexahydrate (10 volunteers for each salt). There were big variations in excretion between different individual persons but there were no significant differences between the different salts. The graphs presented indicate that after this dose, about 1 to 30% of the compound is excreted in the urine within 24 hours.

F. Hawking

Languillon, J. Carte des filaires du Cameroun. [**Map of Filariasis in the Cameroons**] *Bull. Soc. Path. Exot.* 1957, May–June, v. 50. No. 3, 417–27, 1 fig.

The author's conclusions are translated freely from the French as follows:—

We give a map of the [distribution and incidence of] microfilarial infections of blood and skin in the Cameroons. During our investigation we have taken 7,271 blood samples at night and 2,425 samples during the day; 4,076 specimens were taken from skin. The total number of examinations was 13,772. The results are as follows: *D. perstans* in 78% of those examined; *Loa loa* in 24%; *W. bancrofti* in 18%; *O. volvulus* in 19·6% (in the savannah); *D. streptocerca* in 8·7%. Although *O. volvulus* occurs throughout the territory, *D. streptocerca* is only found in the forest regions.

Microfilarial infections of the blood occur in well-defined zones. The microfilaria of *W. bancrofti* is found only in the north, between the 9th and 13th parallel. Those of *D. perstans* and *Loa loa* are found between

the 2nd parallel (the southern limit of the Cameroons) and the 7th parallel (the northern limit of the forest country). There is a small focus of *W. bancrofti* in the fishery region of Douala.

[The author comments, in the text of his paper, that *W. bancrofti* infection is very well tolerated and that in North Cameroons no cases of elephantiasis or adenitis were encountered. He suggests that this may be correlated with the warm dry climate of the region which is unfavourable for associated streptococcal infections, without which *W. bancrofti* is " not sufficient in the aetiology of elephantiasis " (abstracter's translation). The absence of clinical filariasis might also be correlated with the low incidence of the infection (18%) and hence probably a low transmission rate and intensity of infection.] *J. J. C. Buckley*

Rahman, J., Singh, M. V. & Gujral, J. S. **Investigation of Filariasis Problem in Ballia Town (Uttar Pradesh).** *Indian J. Malariology.* 1957, June, v. 11, No. 2, 163–7, 1 map.

In this survey, carried out in a town of over 30,000 inhabitants, some 10% of the population were examined between 8.30 and midnight. Of 3,179 blood films, 12·05% showed microfilariae, the average infection rate being 28·2 in 20 cmm. of blood. The infection rate rose from 5% in the 2–5 age-group to 12·6% in those of 16 years and above. The disease rate was 34·47%, the most common lesion being hydrocele. In 1,096 persons with filarial disease 7·8% showed microfilariae as compared with 14·2% in those without filarial disease. The endemicity rate was 43·8%. *Culex fatigans*, which were very numerous, appeared to be the vector; of 365 dissected 17 were infected, including 5 with fourth-stage larvae. One *Anopheles splendidus* among 8 dissected was found to have early forms in the thorax only. *T. H. Davey*

South Pacific Commission. Nouméa, New Caledonia. **Annotated Bibliography of Filariasis and Elephantiasis. Part 3. Symptomatology, Aetiology, Pathology and Diagnosis of Filariasis due to *Wuchereria bancrofti* and *W. malayi*** [Iyengar, M. O. T.]. *Technical Paper No. 109.* 1957, July, xvi + 276 mimeographed pp., 1 map.

[See this *Bulletin*, 1956, v. 53, 1365.]

Laigret, J., March, H. N. & Kessel, J. F. Action de la cortisone et de la prednisone sur l'éléphantiasis. [**Action of Cortisone and Prednisone on Elephantiasis**] *Méd. Trop.* Marseilles. 1957, Nov.–Dec., v. 17, No. 6, 891–8, 10 graphs. [11 refs.]

In the campaign against filariasis in Tahiti undertaken by the *Institut de Recherches Médicales de l'Océanie Française* since 1949, the endemicity of this disease has been greatly reduced, but elephantiasis, especially of the extremities, has proved resistant to any form of therapeutics. For

these reasons Markell and Kerrest [this *Bulletin*, 1956, v. 53, 470] commenced their experiments with cortisone on 7 subjects with elephantiasis. To these the authors have now added another 10. They were able to give 100 mgm. of cortisone, or 20 mgm. of prednisone, daily for the first two or three weeks. Subsequently this dosage was reduced in accordance with the results obtained. During the not infrequent interruptions the initial dosage had to be resumed. Subsidiary treatment took the form of elastic bandaging, together with Unna's paste. All patients, at the termination of treatment, showed a very considerable reduction of the elephantoid swelling. In 6 the body weight diminished in parallel proportion to the elephantiasis. In the remainder it was stationary. In all a very considerable improvement in the texture of the skin was noted. The majority exhibited a new form of *joie de vivre*, delicately labelled "locomotor euphoria". The sensation of constant tension and dead weight of the affected limbs disappeared. 4 of the 10 patients during the second month of treatment suffered from lymphangitis superimposed upon the elephantiasis.

It was undeniable that cortisone and prednisone, aided by bandaging, very considerably improved the elephantiasis in a remarkable manner. However, it was not possible to treat a large number in these islands on account of the high cost. Markell and Kerrest in their follow-up asserted that improvement did not last for long. In the present series it appeared to be more prolonged. It seems probable that the employment of corticoadrenal hormones in the treatment of elephantiasis has come to stay. In experiments to be undertaken in the future it seems indispensable that this hormone should be given in higher doses over a longer time, for short periods with frequent interruptions.

For the most part the lymphangitis observed during the treatment remained confined to the upper layers of the integument and appeared to be due to low-grade sepsis in a limb with greatly disturbed lymphatic circulation in a population, such as the Tahitians, who are constantly exposed to trauma both by land and sea.

The list of patients treated by this method includes 4 women and 6 men ranging in age from 34 to 66. 2 suffered from elephantiasis of all four extremities, 3 had the disease in both legs (11–12 years' duration), two in one arm and one leg, and the remainder in one leg only. All were negative for microfilariae. *Philip Manson-Bahr*

Galliard, H. La filariose à *Wuchereria malayi* dans la peninsule malaise et en Inde (Travancore). [**Filariasis due to** *Wuchereria malayi* **in Malaya and in Travancore**] *Ann. Parasit. Humaine et Comparée*. 1957, Apr.–June, v. 32, No. 3, 271–85, 9 figs. on 4 pls. & 4 text figs.

The author describes a visit, in 1955 and 1956, to Malaya and India where filariasis due to *W. malayi* is of especial interest in that there is irrefutable correlation between the parasitic infection and filarial disease.

In the Malay peninsula *W. malayi* is the predominant species of filarial worm in man; *W. bancrofti* occurs only in Penang and the upper reaches of the Pahang river. It is found in 3 different kinds of country, riverine, coastal and mountainous forest. In the riverine zones the vector mosquitoes are *Mansonioides* spp. and in the coastal zones *Anopheles* spp. The vector in the high forest is unknown. In the north-west the periodicity of the microfilariae is nocturnal and the vector is *A. barbirostris*. Elsewhere there is not a marked nocturnal periodicity and the vector is *Mansonioides*, the principal vector being *M. longipalpis*, a widespread species whose larvae breed in the forest. Certain domestic and forest animals also harbour *malayi*-type microfilariae and two different species of *Wuchereria* have been isolated from them. [The author's statement that none of these animals are reservoirs of the human infection cannot be accepted unreservedly.] In one of the largest riverine foci (the Pahang River) the incidence of microfilaraemia is 41%, and 58% of children under 5 years are infected and 7% under one year; an infant of 3½ months was found infected. The clinical picture is one of fever, adenitis, retrograde lymphangitis (*ular-ular*) and elephantiasis (*untut*). Elephantiasis does not extend above the knee and occurs in 7% of the people. Hydrocele is very rare.

At Travancore (India) both *W. bancrofti* and *W. malayi* are present. The former predominates in the towns and is transmitted by *Culex fatigans*; the latter is rural and is transmitted by *Mansonioides* spp. and *Anopheles* spp. *W. bancrofti* causes hydrocele and epididymitis while *W. malayi* affects the limbs, especially the legs.

The infection is of particular interest in Travancore on account of the great variation in its distribution and the correlation which exists between the incidence of microfilaraemia and that of the clinical condition. The author enumerates and discusses the factors involved in this variation, which are concerned with topography, geology, the biology of the vector mosquitoes and economics. The epidemiological evidence available in this region is very strongly in favour of the filarial aetiology of elephantiasis and its other clinical relatives. This argument is developed at some length by the author. He also points to the fact that in Tahiti where control measures in the past 5 years have reduced the incidence of microfilaraemia in the people almost to nil and also the infection rate in the mosquitoes, there has been a reduction of 80% in the cases of lymphangitis. *J. J. C. Buckley*

Biagi F., F. Observaciones sobre mansonelosis en la Península de Yucatán. IV. Diagnóstico parasitoscópico y longitud de las microfilarias. [**Observations on *Mansonella ozzardi* in the Yucatán Peninsula. IV. Microscopical Identification and Length of the Microfilariae**] *Medicina*. Mexico. 1957, Apr. 10, v. 37, No. 769, 145–7, 1 fig. [10 refs.]

The following is a translation of the author's summary:—

Data are presented on the observation of microfilariae of *Mansonella ozzardi* in fresh drops and thick films taken from capillary and venous blood treated with oxalate, coagulated and treated with formalin and acetic acid.

560 microfilariae were measured and it was found that formalin and acetic acid accentuated the size. The lengths obtained were considerably less than those found by other authors and in other endemic areas [see this *Bulletin*, 1955, v. 52, 1246; 1956, v. 53, 88]; this is discussed.

H. J. O'D. Burke-Gaffney

Muirhead-Thomson, R. C. **Effect of Desiccation on the Eggs of *Simulium damnosum* Theobald.** [Correspondence.] *Nature*. 1957, Dec. 21, v. 180, 1432–3.

Large masses of eggs of *Simulium damnosum* could be collected on leaves in natural breeding places (in Liberia) and this provided the opportunity for laboratory tests on the survival of eggs if exposed to desiccation. Egg masses were exposed in a beaker for different periods up to 6 days to normal laboratory air conditions, about 70–95% relative humidity and 27°–28°C. In some instances, the eggs were between 16 and 24 hours old. Hatching took place in 65 hours or less. All eggs exposed for 18 hours or less in the humid air hatched, but, except for a few larvae which appeared after 48 hours, eggs failed to hatch in several experiments of 24, 42, 48 hours and 3½, 4, and 6 days of exposure. The conditions were much less severe than would be expected in nature in a dry season in West Africa and it is concluded that, in the northern and savannah territories, dry season survival in the egg stage is unlikely.

[See also Crisp, this *Bulletin*, 1957, v. 54, 594.] *D. S. Bertram*

Crosskey, R. W. **Further Observations on Infection of *Simulium damnosum* with *Onchocerca volvulus* in Northern Nigeria.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Nov., v. 51, No. 6, 541–8, 3 figs.

In Northern Nigeria, infection rates for infective larvae of *Onchocerca volvulus* in *Simulium damnosum* were obtained for each month from June to October (the rainy season) at Abuja and Kudaru. The infection rates ranged from 0·3% to 16·8%. At Kudaru fly numbers showed two peaks of 12 and 10 flies per boy-hour in July and September respectively; at Abuja there was a single peak of 16 flies per boy-hour about September. The main emphasis of the whole paper is that the infection rates in both areas were lowest when fly numbers were high, and highest when the numbers were moderate. For Abuja it is estimated that, on certain assumptions, the number of infective bites per person per day is 1·32 in June (early rains) and 1·87 in October (late rains) but always less than one bite per day in the intervening period of peak density during the main

rains. It is then suggested that it may be suspected that infections with onchocerciasis in some Africans, especially fishermen, may be particularly severe because they frequent the river courses most when, as these figures indicate, transmission is at its highest level. This argument is not applied to the Kudaru area with—for some reason not given—higher fly densities in the early and the late rains and an intervening fall in numbers at the height of the rains.

The effect of increments of new flies on infection rates is appreciated and a particular case in point is detailed for a third locality, Lokoja. Here the infection rates rose from 0 to 5·2%, in the fortnight following the first emergences at the start of the rains.

[For earlier studies by the author, see this *Bulletin*, 1955, v. 52, 1127.]

D. S. Bertram

RODGER, F. C. **Posterior Degenerative Lesion of Onchocerciasis.** *Brit. J. Ophthalm.* 1958, Jan., v. 42, No. 1, 21–37, 1 fig. [31 refs.]

This is another in the series of papers published by Rodger on the results of his West African Survey of blindness and onchocerciasis [this *Bulletin*, 1958, v. 55, 95]. It contains a number of interesting and original observations, and interesting and original theories. It does not, however, provide an answer to the most important question of all: Exactly what percentage of blindness is in fact caused by onchocerciasis?

The nearest he gets is the statement that in the course of his survey 165 cases of the posterior degenerative type of lesion were noted, which represented 5% of all blindness due to onchocerciasis. This tends to confirm the view of other authors that this disease is essentially an anterior segment disease, so far as the ocular involvement is concerned.

He describes two types of onchocercal lesions in the posterior uvea, one being due to the death of microfilariae in or adjacent to the choroid and being inflammatory in type. Unfortunately he does not make it clear how frequently this phenomenon is supposed to occur. The other is a degenerative lesion, not related to a high-level intensity of infection.

He gives examples of other types of chorioretinal diseases which may confuse the diagnosis, *e.g.*, primary chorioretinal degenerations, such as central choroidal sclerosis and retinitis pigmentosa; circumscribed tuberculosis of the choroid; syphilitic chorioretinitis and disciform degeneration of the macula.

He discusses the evolution of the posterior degenerative lesion found in onchocerciasis. He concludes that onchocerciasis alone is not enough to produce these lesions, and he puts forward the interesting theory that they do not appear unless onchocerciasis is associated with serious vitamin A deficiency. Some of his patients with early posterior degenerative lesions experienced improvement in visual acuity and lessening of night blindness when given massive doses of vitamin A, but this therapy did not benefit the fully developed cases of choroidal sclerosis.

He concludes by suggesting that a combination of vitamin A deficiency with a toxin liberated by free adult worms could explain the onset of these posterior degenerative lesions. This theory is supported by the fact that the lesion does not occur in cases where vitamin A deficiency or onchocerciasis exist by themselves, but only when the two conditions are associated.

[In the opinion of the abstracter the known facts could equally well be explained on the basis that onchocerciasis has nothing to do with these lesions, but that tapeto-retinal degenerations of a hereditary nature are exceedingly common in Africa, their development being accelerated in areas where vitamin A deficiency is prevalent.

This is a most interesting and stimulating paper, and should be read by anyone with an interest in the subject.] *D. P. Choyce*

Ando, T. [**A Study of** *Gnathostoma spinigerum*] *Igaku Kenkyu.* Fukuoka. 1957, Oct., v. 27, No. 10, 2342–59, 7 figs. [92 refs.] [In Japanese.] English summary.

The first part of this study is concerned with paper chromatography of the amino-acid, fat and sugar components of the body of *Gnathostoma spinigerum*. The various substances identified are defined and figured.

In the second part experiments are described in which various substances were used as antigens in a cutaneous test on patients with gnathostome infection. The protein fraction from the larval form of the worm gave a positive reaction in a dilution of 1 in 1,000,000 and that of the adult worm in 1 in 100,000. The fat and sugar fractions of larvae and adult alike gave positive reaction in 1 in 5,000. When the protein fraction alone was extracted its superior antigenicity was confirmed.

The solution in which the larva and adult were kept gave a positive skin reaction, showing that the antigenic substance was excreted from the body of the worm.

When extracts of different parts of the nematode body were tested it was found that those of the oesophagus, intestine and body wall of the larva produced a skin reaction at 1 in 500,000; extracts from the same tissues and from the genitals of the adult worm were positive at 1 in 50,000. In each case the extract from the oesophagus was the most antigenic.

Extracts of the flesh of the freshwater fish *Ophicephalus argus* (infected or not infected with *G. spinigerum*) were injected subcutaneously into patients with gnathostomiasis, into habitual eaters of the fish and into healthy persons who had never eaten it. The cutaneous reaction was positive in 16 of 60 patients, 5 of 120 habitual fish eaters and none of 50 normal persons. It would seem that there is some antigenic substance common to *G. spinigerum* and *O. argus*.

The cutaneous reactions produced are shown in 4 photographs in the Japanese text. *H. J. O'D. Burke-Gaffney*

Takizawa, K. [**Pharmacological Studies on the Toxin of** *Gnathostoma*] *Igaku Kenkyu.* Fukuoka. 1957, Nov., v. 27, No. 11, 2747–66, 14 figs. [64 refs.] [In Japanese.] English summary.

McCowen, M. C., Callender, M. E. & Brandt, M. C. **The Anthelmintic Effect of Dithiazanine in Experimental Animals.** *Amer. J. Trop. Med. & Hyg.* 1957, Sept., v. 6, No. 5, 894–7.

The authors studied the effect of Dithiazanine (3-3′ diethylthiadicarbocyanine iodide) on oxyurids in mice, ascarids, *Trichuris* and hookworms in dogs, ascarids in cats and *Strongyloides ratti*.

White mice experimentally infected with *Syphacia obvelata* and *Aspiculuris tetraptera* were given doses of 0·1, 0·05, 0·01 and 0·0025 of Dithiazanine for 1 to 7 days. After 48 hours a dose of 0·01% had removed all the *S. obvelata* and after 72 hours it had removed 83% of *A. tetraptera*. Swartzwelder, in a personal communication to the authors, reported that Dithiazanine also removed *Strongyloides ratti*.

As Table I shows, doses of 0·1%, 0·05% and 0·01% of the drug given for 7 days removed 100% of the oxyurids; doses of 0·01%, given for 1 day removed 83% and the same dose given for 2, 3 or 4 days removed 100%; and doses of 0·0025% given for 7 days removed 85% of them. The untreated controls lost either none or only 10% of the worms.

Egg counts done on 6 dogs weighing 6 to 9 kgm. showed that they were all infected with "ascarids, hookworm or whipworm". To 2 dogs 5 mgm./kgm. of Dithiazanine were given in capsules orally twice a day for 3 months and 2 other dogs were given 10 mgm./kgm. twice a day for 3 months, 2 dogs remaining untreated as controls. Weekly egg counts were done. After 3 months the 4 treated dogs were killed; no eggs of ascarids, hookworms or whipworms were then found. The table shows that at autopsy 3 months after treatment none of the 4 treated dogs had helminths. To 6 other dogs 10 mgm./kgm. of the drug were given daily for 4, 5 or 7 days and all had negative egg counts after these periods. All of 6 cats given 10 mgm./kgm. of the drug for 5, 6 or 7 days had no ascarid or hookworm eggs after treatment.

The drug coloured the faeces of dogs and cats blue. [See Frye *et al.*, below.] *G. Lapage*

Frye, W. W., Swartzwelder, C., Lampert, R., Abadie, S. H. & Carson, C. B., Jr. **An Effective Trichuricide suitable for Oral Administration.** *Amer. J. Trop. Med. & Hyg.* 1957, Sept., v. 6, No. 5, 890–93, 1 fig.

McCowen *et al.* [above] found that Dithiazanine (3-3′ diethylthiadicarbocyanine iodide) was effective against ascarids, hookworms and *Trichuris vulpis* in dogs and the authors gave this drug to 40 patients infected with *Trichuris trichiura*, although none of them were showing

symptoms. Stools were collected on the third and seventh days after treatment began and also one and 3 months after treatment and these were examined by the "formalin-ether centrifugal concentration" technique. Egg counts were not done.

Two dosage schedules were used. To 16 patients 200 mgm. were given 3 times a day for 5 days, and 17 patients were given 200 mgm. twice a day for 5 days. Patients weighing less than 90 lb. were given half these doses. The drug was given in 100 mgm. CAP-coated tablets designed to delay its release until it had passed through the stomach. The following table shows the results:

Adult dose	*No. of patients treated*	*Stools positive for Trichuris eggs*			
		after 3 days of treatment	2 days after treatment ended	1 month after treatment ended	% free from infection 1 month after treatment
200 mgm. thrice daily for 5 days	16	10	4	2	87·5
200 mgm. twice daily for 5 days	17	8	5	5	71

There were no signs of intolerance of the drug.

The authors state that unpublished studies by Swartzwelder *et al.* have shown that patients with heavy infections with whipworms can be cured by this drug. Large numbers of adult trichurids were passed after only one day of the treatment and the expulsion of them continued. The trichurids were flaccid and seemed to be dead. Swartzwelder *et al.* also found that *Trichuris trichiura* were expelled as were *Ascaris lumbricoides*. Immature and mature *A. lumbricoides* were stained light green when they were passed and were flaccid and immobile, but, unlike the trichurids, they recovered motility when they were rinsed in water and incubated at 37°C. —*G. Lapage*

Coutelen, F., Deblock, S., Biguet, J. & Capron, A. L'oxyurose appendiculaire à propos de 132 appendicectomies chez les enfants du Nord de la France. Rôle de l'oxyure dans le déterminisme de l'appendicite et des syndromes appendiculaires. [**Enterobiasis of the Appendix (based on 132 Appendicectomies in Children in Northern France**] Reprinted from *Écho Méd. du Nord.* 1956, Mar., v. 27, No. 3, 114–31. [Numerous refs.]

The incidence of infection with *Enterobius vermicularis* in Northern France has been variously recorded as from 39–87% [see Coutelen *et al.*, this *Bulletin*, 1952, v. 49, 970] and the present authors found 57·5% of 132 appendices removed from children (130 between the ages of 7 and 15 years) to be infected. The number of worms present varied from 1 to 117

but in 64·4% there were between 1 and 10. No characteristic lesions attributable to *E. vermicularis* were demonstrated and only on rare occasions did it appear probable that the infection had caused appendicitis. In one such case the appendix appeared to be " stuffed " with the worms. The authors think, however, that the infection may at times be responsible for pain at McBurney's point. Drugs do not readily reach the appendix and the prior administration of anthelmintics has not prevented the recovery of live *E. vermicularis* at appendicectomy [Vucetich and Giacobbe, *ibid.*, 1950, v. 47, 150].

The authors do not advocate fewer appendicectomies but draw attention to the need for greater efforts to be made to eradicate *E. vermicularis*. They give very full bibliographical lists of the findings of other authors and the countries of origin.

[It would be of interest to know if live *E. vermicularis* are found in the appendix after treatment with piperazine compounds.]

Frederick J. Wright

Harfenist, M., Fanelli, R. V., Baltzly, R., Brown, H. W., Hussey, K. L. & Chan, K. F. **The Relation of Piperazine Mono-Quaternary Salt Structure to Activity against** *Syphacia obvelata*, **a Mouse Pinworm.** *J. Pharmacol. & Exper. Therap.* 1957, Nov., v. 121, No. 3, 347–53.

Markell, E. K. & Lewis, W. P. **Effect of Cortisone Treatment on Immunity to Subsequent Reinfection with** *Trichinella* **in the Rat.** *Amer. J. Trop. Med. & Hyg.* 1957, May, v. 6, No. 3, 553–61. [32 refs.]

" Cortisone was administered to 40 of a total of 60 rats, starting on the day when all animals were infected with *Trichinella* larvae by stomach tube. Twenty animals were treated for a total of 30 days; the other 20 received cortisone for 60 days. Five months after the primary infections, approximately half of each group of rats was reinfected. Five weeks later, all animals were killed; serum was taken for serologic studies and larval counts were made to determine the numbers of larvae encysted in the musculature. Animals treated for 30 days with cortisone developed slightly greater numbers of encysted larvae than their untreated controls; those treated for 60 days were found to contain very much larger numbers of larvae in the muscles. Upon reinfection, the untreated controls failed to develop additional larvae in the musculature, while the animals treated for 30 and 60 days developed large (and approximately equal) numbers of larvae.

" Serologic studies, using lyophilized larvae as the source of antigen for a microflocculation test, demonstrated the presence of a measurable amount of circulating antibody in the untreated controls after primary infections. More of the animals demonstrated higher titers of antibody

upon reinfection. Animals treated with cortisone for 30 days developed a high titer of circulating antibodies, while those treated for 60 days largely failed to develop any demonstrable antibodies.

"To explain the lack of immunity to reinfection on the part of both 30- and 60-day treated animals, in spite of the presence of a high titer of circulating antibodies in the 30-day group, it is suggested that resistance to adult worms may be brought about by a specific delayed tissue hypersensitivity of the infectious variety, involving the intestinal mucosa. There is some evidence that such hypersensitivity may be masked by the action of cortisone."

YEH LIANG-SHENG & JORDAN, P. **On a New Gordiid Worm,** *Pseudogordius tanganyikae* **gen. et sp. nov., Parasitic in Man.** *Ann. Trop. Med. & Parasit.* 1957, Sept., v. 51, No. 3, 313–16, 1 fig.

"1. A description is given of a single adult female gordiid worm passed by a five-year-old European girl in East Africa.

"2. The worm belongs to a hitherto undescribed genus and species of the family Chordodidae May, 1919, for which the name *Pseudogordius tanganyikae* is proposed.

"3. It is believed that the worm was passed *per urethram*, though the possibility cannot be excluded that it was passed *per rectum* or even that it came from some extraneous source. If the passage was in fact *per urethram*, the present record is the third human case of a gordiid passed by that route."

DEFICIENCY DISEASES

See also p. 451, OOMEN, **The Incidence of Xerophthalmia in Java in relation to Age and Sex.**

GALLAIS, P., RAINAUT, J., PREVOST, A. & RAOULT, A. Les neuropathies nutritionnelles. [**Nutritional Neuropathies**] *Bull. Méd. de l'A.O.F.* Dakar. 1956, v. 1, No. 4, 273–88. [30 refs.]

PLATT, B. S. **Protein Malnutrition and Infection.** *Amer. J. Trop. Med. & Hyg.* 1957, Sept., v. 6, No. 5, 773–9. [27 refs.]

"A number of examples from recent research are given of the influence of protein and amino-acids on the metabolism of infecting organisms; of infecting organisms on host metabolism; and of the role of protein in determining the susceptibility and resistance to infection and its course

when established. A comparatively neglected aspect of the subject of host-parasite relationships is the effect of the zymotic disease factor on the nutritional status of the host. Some success may attend treatment either by dietary means or by eradication of the infecting agent. There are however grounds for believing that for complete recovery a two-pronged attack is likely to be necessary. Also, even if the nutritional defect is predominantly of protein origin, it will no doubt be found that the best results will follow rehabilitation on a diet adequate and balanced in all respects. It is also noted that the repletion of protein-depleted subjects may require many months of protein feeding at levels above that to which the diseased patient had been accustomed."

Senecal, J., Cesaire, G., Raquet & Dupin, H. Etude chromatographique du sérum et des urines dans le Kwashiorkor. (Note préliminaire.) [**Chromatographic Study of Serum and Urine in Kwashiorkor; Preliminary Note**] *Bull. Méd. de l'A.O.F.* Dakar. 1957, July–Sept., v. 2, No. 3, 342–8, 3 figs. [14 refs.]

The authors are exploring the possibility that a specific deficiency of one or more amino-acids underlies the metabolic disturbances of kwashiorkor, and this preliminary note gives the results of chromatographic analysis of the serum and urine of 7 control children aged 10–30 months, and of a group of children with kwashiorkor. A table shows the frequency with which each of 16 amino-acids was detected in the sera of the controls, and of 17 affected children; little difference is apparent, except for lysine, which appeared in 4 out of 7 controls and 5 out of 17 patients. Results in the case of urinary specimens were more irregular, but in affected children both the number and density of the spots appeared to exceed those in the controls. Under treatment with a high protein diet, several cases of kwashiorkor in which the serum amino-acids had been reduced, showed an increase above normal values by the 7th day, and thereafter a fall to normal. Similar changes occurred in the urinary specimens in the few cases tested.

The authors take care to point out that their results are not quantitative, and that the essential tryptophan, methionine, and histidine were not detectable by the technique used. However, they consider that the increased urinary elimination of amino-acids in kwashiorkor is explained by the lack of some amino-acids (established as far as lysine is concerned), which in turn prevents the utilization of others. *Alan B. Raper*

Follis, R. H., Jr. **A Kwashiorkor-Like Syndrome observed in Monkeys fed Maize.** *Proc. Soc. Exper. Biol. & Med.* 1957, Nov., v. 96, No. 2, 523–8, 3 figs. [10 refs.]

Kwashiorkor is a disease seen in children who have been weaned and receive a diet which is poor in quantity and quality of protein. A maize

diet is both poor in protein and deficient in at least 2 amino-acids, tryptophan and lysine. The author fed 8 young monkeys (*Cercopithecus griseoviridis* or *aethiops*) with maize and supplemented this diet with ascorbic acid to prevent the development of scurvy. 4 animals served as controls, 1 receiving an adequate ration, and 3 receiving rice supplemented with ascorbic acid.

Growth curves are reproduced for 3 representative animals, 2 on the maize diet and 1 a control. The initial weight was about 2,350 gm. The monkeys on the maize diet lost 800 and 600 gm. in 35 and 41 weeks respectively, whereas the control animal gained 1,500 gm. in a similar period. There was no change in the colour of the coat, and only in 1 of the 8 monkeys on the maize diet was there a loss of hair over the top of the head. Periorbital oedema was noted in 1 after 26 weeks.

Liver biopsies were taken during life and a complete examination was made post mortem. Fatty changes in the liver occurred at first in the periportal regions of the lobules, and then spread to involve the remainder of these structures. There was atrophy of the intestinal glands, loss of lipids in the adrenal cortex, and arrest in the growth of the bones. Cross-sections of the cortices of the long bones revealed a failure of the normal primary bone to be replaced by osteons. Thus the skeletal tissue was more immature than it should have been at the particular age of these monkeys. In 2 monkeys dying in the late stages of the deficiency the concentration of the total plasma proteins was reduced; this change followed rather than preceded the fatty infiltration of the liver.

The authors conclude that the deficiency syndrome in monkeys reared on a maize diet has many of the characteristics of kwashiorkor in children.

H. Lehmann

Gillman, J. & Gilbert, Christine. **Fatty Liver of Endocrine Origin with special reference to Fatty Liver of Malnourished African Infants.** *Brit. Med. J.* 1958, Jan. 11, 57–63. [Numerous refs.]

"Fatty liver has been produced consistently in the baboon by various endocrine techniques. Irrespective of the way a particular hormone altered metabolism, a fatty liver did not emerge unless insulin was relatively or absolutely insufficient and an adequate amount of adrenocortical hormone was available. It was demonstrated that in defined circumstances thyroxine could promote the resolution of a fatty liver.

"Amongst their other metabolic effects, insulin and cortisone stimulated fat synthesis and storage in the depots, while insulin and excess thyroxine, even in the presence of excess cortisone, promoted fat mobilization and oxidation. A fatty liver was shown to be dependent at least on a dynamic relationship between insulin, the thyroid, and adrenocortical hormones.

"It is suggested that the acutely developing fatty liver of malnourished African infants might be related to an acute endocrine disturbance

involving the islets of Langerhans, the adrenal cortex, and the thyroid gland, and not necessarily to atrophy of the exocrine part of the pancreas."

SPRUE

Rodríguez-Molina, R., Asenjo, C. F. & Cancio, Marta. **Steatorrhea in Tropical Sprue Patients in Puerto Rico.** *Amer. J. Trop. Med. & Hyg.* 1957, Sept., v. 6, No. 5, 780–85. [12 refs.]

The present investigation was stimulated by the scarcity of published work on fat excretion in sprue patients and partly by Woodruff [this *Bulletin*, 1953, v. 50, 329] who has suggested that the sprue disease reported from the Caribbean (Cuba and Puerto Rico) is probably not the same as that in India, but is rather a nutritional megaloblastic anaemia associated with steatorrhoea.

10 white and 2 coloured patients were included in the present study. Diagnostic criteria included insidious onset, chronicity of symptoms and paucity of spontaneous remissions, gastro-intestinal disturbances, stomatoglossitis, with or without atrophy of the lingual papillae, a history of recent loss of weight, with increasing weakness, and free hydrochloric acid in the stomach, macrocytic, hyperchromic anaemia associated with a megaloblastic marrow. In addition there was a flat glucose tolerance curve, absence of neurological manifestations in the greater majority, and hyperpigmentation of the skin, particularly of face, arms and legs.

A fat-balance study was continued for 8 days. From the third day after the special diets, all 24-hour stools were collected for fat analysis. With the oral glucose tolerance test a flat curve was obtained in 9 cases, a normal in one. With the vitamin A tolerance test, low values were obtained for the single patient with acute sprue, while for 5 patients with chronic sprue in relapse, values ranged from 36 to 105 μgm. per 100 ml. of serum in the fasting state, from 37 to 127 μgm. in the 5-hour specimen, and from 42 to 139 μgm. in the 7- to 8-hour specimen. For the remaining patient with chronic sprue in relapse a value of 288 μgm. per 100 ml. of serum was obtained. Serum-vitamin-B12 levels were determined in 4 cases. Values obtained, in micro-microgrammes per ml. were 45, 50, 70 and 148—all low compared with a value of 400 which is considered normal. The D-xylose absorption test in 6 patients gave values of 1·1 to 2·4 gm., all lower than the normal value of 4 gm.

In fat-balance tests the results were studied in 14 subjects. The stools were fluid or semi-fluid, bulky, pale and offensive and contained over 6 gm. and up to 50 gm. of fat per 24 hours. (Each of the control subjects passed less than 3 gm. of fat daily in the stools.)

The criteria used for selecting these small groups of cases were based on observations made before the era of liver extracts, folic acid or vitamin B12. In those days the clinical picture of sprue differed from that of the modified disease encountered at the present day. Formerly the standard of living in Puerto Rico was perhaps 50% below the present level. The general sense is that sprue, as it was formerly known, is now never given a chance of developing. *Philip Manson-Bahr*

HAEMATOLOGY

Higginson, J., Keeley, K. J., Andersson, M. & Walker, A. R. P. **Serum Iron Levels in Siderosis due to Habitually Excessive Iron Intake.** *J. Clin. Investigation.* 1957, Dec., v. 36, No. 12, 1723–5.

It has long been known that there is a heavy iron intake in the South African Bantu probably connected with the use of iron pots for cooking [this *Bulletin*, 1953, v. 50, 868; 1954, v. 51, 224, 300]. This had been related to the frequency of haemosiderin deposition in the liver and other organs, known to occur in them. The authors examined side by side the serum iron level and the degree of haemosiderosis of the liver in 26 South African Bantu adults and one child. The haemosiderosis of the liver was assessed from liver biopsies. There was no correlation between serum iron level and severity of siderosis once the liver contained significant deposits of iron. If, however, siderosis was not advanced there was a good correlation between the mean serum iron level and the degree of iron deposition in the liver. *H. Lehmann*

Ferro-Luzzi, G. L'anemia macrocitica da malnutrizione in Eritrea. [**Macrocytic Anaemia from Malnutrition in Eritrea**] Reprinted from *Ricerca Scientifica.* 1957, Aug., v. 27, No. 8, 2443–8. [20 refs.] English summary (5 lines).

The first indigenous case reported from Eritrea.

Groch, S. N. & Hanlon, D. G. **Studies of Erythrocyte Osmotic Fragility in Iron Deficiency Anemias.** *J. Lab. & Clin. Med.* 1957, Dec., v. 50, No. 6, 894–6. [10 refs.]

" Studies of erythrocyte osmotic fragility were performed in 27 cases of iron deficiency anemia of known causation. It was adequately demonstrated that increased osmotic resistance to hypotonic solutions of sodium

chloride occurs in this type of anemia. Studies of erythrocyte osmotic fragility, therefore, are of little or no value in attempts to distinguish the trait form of hereditary leptocytosis from iron deficiency anemias."

KLINE, A. H. & HOLMAN, G. H. **Hereditary Spherocytosis in the Negro.** *J. Dis. Children.* Chicago. 1957, Dec., v. 94, No. 6, 609–15, 2 figs. [31 refs.]

The case of a 10-year-old Negro boy affected by hereditary spherocytosis is described from Baltimore, and the findings in some 30 of his relations are given. Besides the propositus, his mother, a maternal aunt and two maternal uncles, and a male cousin, were found to be affected. Clinically these cases were not remarkable, showing the usual variations in degree of the affection, and laboratory findings were typical (abnormal haemoglobins and acquired haemolysins were excluded), but it was of interest that the first patient presented in an aregenerative crisis.

Previously reported cases of acholuric jaundice in Negroes are reviewed, and with the present 6 the acceptable cases now number 42, occurring in 13 families, some of which "appear to be of as pure Negro stock as exists" in the United States. All the available evidence confirms the rarity of this condition in Negroes, but the previously held view that Negro females were predominantly affected is now less likely, the female to male ratio in these 42 cases being 3 to 2. The mode of transmission in the present family is consistent with dominant inheritance.

Alan B. Raper

FESSAS, P. & PAPASPYROU, Athena. **New "Fast" Hemoglobin associated with Thalassemia.** *Science.* 1957, Nov. 29, v. 126, 1119, 3 figs.

The authors have discovered a new haemoglobin in the cord blood of an infant. It disappeared from the child's blood within the first 3 months of life, and was not found in either parent. There are now known 4 human haemoglobin variants which on electrophoresis at *p*H 8·6 move faster than the normal adult haemoglobin (A). They are, in order of their mobility, H = I, J, and K. The new pigment moves between the J and K variants. At *p*H 6·5 only haemoglobin H is known to move clearly away from A, and I, J and K show virtually no separation. The new haemoglobin separates from A at *p*H 6·5 and is found between the A–K–J–I group and haemoglobin H. The father had thalassaemia minor and the mother thalassaemia major. The indications were that the child definitely carried one, and possibly two, doses of the thalassaemia gene. The authors suggest that the new "fast" haemoglobin was possibly an abnormal foetal haemoglobin, hitherto not recognized, which found expression because of its association with thalassaemia. This argument is based on the genetic behaviour of haemoglobin H which is said to appear in the

phenotype only in association with thalassaemia. An alternative explanation would be that the pigment has arisen as a new mutant.

H. Lehmann

See also p. 424, Jacob, **A Study of the Relationship between Sickling and Hookworms.**

Charmot, G. & Reynaud, R. Anémie drépanocytaire avec paraplégie spasmodique. Lésions hépatiques et altérations osseuses. [**Sickle-Cell Anaemia with Spasmodic Paraplegia. Hepatic and Osseous Lesions**] *Méd. Trop.* Marseilles. 1957, Nov.–Dec., v. 17, No. 6. 826–9.

A case in an African child.

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Choremis, C., Zannos, Leda, Ikin, Elizabeth W., Mourant, A. E. & Lehmann, H. **Blood-Groups of a Greek Community with a High Sickling Frequency.** *Lancet.* 1957, Dec. 28, 1333–4.

"The A_1A_2BO, MNS, and Rh blood-groups of 119 Greeks around Lake Copais have been investigated. Although sickling has a high frequency in this area, amounting to 27% in this group, the blood-group frequencies do not differ significantly from those of Greece as a whole, and, in particular, they show no evidence of an excess of genes from Africa or any other known area with much sickling."

Colbourne, M. J., Ikin, Elizabeth W., Mourant, A. E., Lehmann, H. & Thein, H. **Haemoglobin E and the Diego Blood Group Antigen in Sarawak and Burma.** [Correspondence.] *Nature.* 1958, Jan. 11, v. 181, 119–20. [14 refs.]

There are now two factors in the blood known to occur in mongoloids rather than in members of the Caucasian and negroid races. One is the blood-group antigen Diego and the other is haemoglobin E. Both, however, show a different frequency distribution, haemoglobin E being most frequent in Burma and Thailand and the Diego factor in American Indians. The authors have examined Burmese and Dyaks (from Sarawak) for both the Diego blood-group antigen and haemoglobin E. It is already known that the Diego factor exists in Asia in Japanese and Chinese and this report describes its observation in the Land Dyaks of Sarawak and in one of 10 Burmese. The number of Burmese examined for the Diego

factor was small because the Diego test serum did not become available until the larger group of Burmese had already been examined. In the Burmese the frequency of haemoglobin E carriers was 16·3%. On the other hand, in 185 specimens from Sarawak, 101 from Land Dyaks and the rest from Sea Dyaks, only one example of haemoglobin E was found.

H. Lehmann

VENOMS AND ANTIVENENES

Balozet, L. La vipère lébétine et son venin. [*Vipera lebetina* **and Its Venom**] *Arch. Inst. Pasteur d'Algérie.* 1957, Sept., v. 35, No. 3, 220–95, 12 text figs. & 6 figs. on 2 pls. [101 refs.]

Shulov, A., Weissmann, A. & Ginsburg, H. [**Experimental Estimation of the Toxic Strength of the Lyophilised Venom of the Scorpion, Viper and Sandviper**] *Harefuah.* Jerusalem. 1957, Dec. 15, v. 53, No. 12 [in Hebrew 309–12, 2 charts. (14 refs.) English summary 312].

The English summary appended to the paper is as follows:—

"The strength of the lyophilised venom of the scorpion *Leiurus quinquestriatus*, the viper *Vipera xanthina palaestina* and the sand viper, *Echis colorata* have been estimated by the DL_{50} method. About 125 white mice of 15 gm. weight were used for each venom. The results are 0·005 mg. for the scorpion, 0·035 mg. for the Levant viper and 0·077 mg. for the sand viper. The scorpion's venom has a quick action and causes general neurotoxic symptoms. The venoms of both vipers act mainly as haemorrhagins, their influence being much slower than that of the scorpion venom."

Minton, S. A., Jr. **An Immunological Investigation of Rattlesnake Venoms by the Agar Diffusion Method.** *Amer. J. Trop. Med. & Hyg.* 1957, Nov., v. 6, No. 6, 1097–107, 5 figs. [10 refs.]

"The agar double diffusion method of Ouchterlony indicates that rattlesnake venoms are composed of at least 4 to 7 antigenic fractions. At least 3 of these are widely shared within the group and at least 3 others are less widely shared. There is reason to believe one of the latter fractions may be associated with a powerful neurotoxin. The venoms of the rattlesnakes have one or more antigens in common with the venoms of

the north American moccasins, *Agkistrodon*. The North American crotalid antivenin (Wyeth) is immunologically polyvalent against the venoms of all of the 14 species of rattlesnakes tested."

LESTER, I. A. **A Case of Snake-Bite treated by Specific Taipan Antivenene.** *Med. J. Australia.* 1957, Sept. 14, v. 2, No. 11, 389–91, 3 figs.

While running in school grounds in Cairns, Queensland, the patient, a boy of 10 years, was bitten above the right knee by a brown snake. He was admitted to hospital and given tiger snake antivenene within half an hour. His condition was satisfactory until the next morning (19 hours after the bite) when he developed ptosis, became drowsy, complained of abdominal pain and vomited frequently. He was given 6,000 units of taipan antivenene and 20 units corticotrophin. An allergic reaction was controlled by adrenaline. A further 3,000 units taipan antivenene was given an hour and a half later. Improvement was obvious half an hour later and he gradually recovered. During the next 4 days his blood pressure remained at about 160/100; it returned to normal (110/70) on the eleventh day after the bite. The bite wound oozed blood for the first 5 days. Albumin was present in the urine during the same period and casts were observed for a fortnight.

The snake was not captured, but circumstantial evidence, particularly the site of the bite, make it reasonably certain that it was a taipan [*Oxyuranus scutellatus*]. The author discusses 3 previous cases of taipan bite, admitted to the same hospital over the previous 5½ years, all fatal. He considers that the present case indicates the value of taipan antivenene.

[For previous accounts of taipan bites see this *Bulletin*, 1950, v. 47, 564; 1951, v. 48, 580.] *B. G. Macgraith*

PACY, H. **Identical Skin-Eruption in Five Men after Massive Exposure to Jellyfish (Aurelia).** *Med. J. Australia.* 1957, Oct. 19, v. 2, No. 16, 580–82, 2 figs.

5 brothers, all oystermen, presented with identical itching papulovesicular rashes on the lower parts of their legs. On the previous afternoon they had waded through shallow sea water containing "thousands of jelly fish". They felt nothing at the time but the rash appeared the next morning 16 hours after the event. The rashes subsided after 8 days. In 3 patients oral and local antihistaminic treatment relieved the itching but did not affect the duration of the rash. The author obtained specimens of the jelly fish the following morning and

exposed his own limbs without result. The specimens were identified as belonging to the genus *Aurelia*, previously considered entirely harmless.

B. G. Maegraith

Tange, Y. Beitrag zur Kenntnis der Morphologie des Giftapparates bei den japanischen Fischen. XVII. Über die Entwicklungsgeschichte des Giftapparates bei den Giftfischen. [**Morphology of the Poison Apparatus of Japanese Fish. XVII. The Developmental History of the Poison Apparatus in the Poisonous Fish**] *Yokohama Med. Bull.* 1957, Apr., v. 8, No. 2, 127–44, 9 figs. [Numerous refs.]

TOXOPLASMOSIS

Makstenieks, O. & Verlinde, J. D. **Toxoplasmosis in the Netherlands. Clinical Interpretation of Parasitological and Serological Examinations and Epidemiological Relationships between Toxoplasmosis in Man and in Animals.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1957, Sept., v. 9, No. 3, 213–24, 4 figs. [14 refs.]

Over 4,000 people in Holland were investigated to ascertain the incidence of past or present infection with *Toxoplasma*. 18 cases from which the parasite was recovered showed positive dye tests (at titres between 1 in 128 and 1 in 16,384) and the complement-fixation test was usually positive also for a limited period. The dye test of 625 healthy people showed that in the first 6 months of life a positive reaction was sometimes present (due perhaps to transplacental antibody), during the second 6 months it was negative, and then it began to rise with increasing age. Active toxoplasmosis manifested itself by the usual symptoms.

The incidence and susceptibility of various animals were tested. 4 monkeys were inoculated with *Toxoplasma*. Parasitaemia developed for 10 days, and this was followed by positive serological reactions; 12–18 months later the animals were killed and the organism was isolated from the brain and mesenteric glands. In the case of 5 patients the existence of toxoplasmosis in their domestic dogs or cats was demonstrated. The serology of dogs, cats, cows, fowls, horses, rats, mice and guineapigs was studied. The reactions were negative in over 4,000 mice, but 79% of the guineapigs were positive, and in 19 of the latter animals pseudocysts were found in sections of the kidneys but in no other organs. [The paper contains no illustrations, and the abstracter wonders if these kidney infections were actually *Klossiella*.] Mice and monkeys were easily infected by subcutaneous inoculation of parasites, but only the former developed infections if *Toxoplasma* (in the form of pseudocysts) was given by the oral route.

P. C. C. Garnham

VAN SOESTBERGEN, A. A. Het beloop van een laboratorium-infectie met *Toxoplasma gondii*. [**A Laboratory Infection with** *Toxoplasma gondii*] *Nederl. Tijdschr. v. Geneesk.* 1957, Sept. 7, v. 101, No. 36, 1649–51, 1 fig. English summary (8 lines).

The English summary appended to the paper is as follows:—

"A laboratory infection with Toxoplasma gondii is described. The parasite was isolated from an enlarged lymph gland removed from the left clavicular region. Although the parasite produced a lethal infection in mice, the patient hardly demonstrated any sign or symptom of the disease. The antibody response in the serum of the patient has been recorded during a number of weeks after the infection had occurred."

DE ROEVER-BONNET, H. **Toxoplasmosis in Slaughter-Cattle, particularly in Sheep.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1957, Dec., v. 9, No. 4, 336–8, 1 fig.

"Thirteen out of 77 head of cattle slaughtered in the Amsterdam slaughterhouse had a positive dye-test. The author succeeded in cultivating toxoplasma from the brains of four out of 30 sheep picked at random."

NAKAJYO, E., IWAMI, I., KUWABARA, C., OKUTANI, M., JYONO, K., TODA, N. & HORIMOTO, T. [**The Incidence of** *Toxoplasma* **in House Rats in Osaka City. Report I. On the Body Passage of Mice**] *J. Osaka City Med. Center.* 1957, July, v. 6, No. 7, 575–7, 1 fig. [In Japanese.]

The English summary appended to the paper is as follows:—

"A total of 105 house rats (Rattus rattus and Rattus norvegicus) caught in the City of Osaka were studied for Toxoplasma as follows:

"Tissue-suspension of the brain, liver and spleen from the 105 house rats were inoculated into laboratory mice. Two strains of Toxoplasma were recovered (1·9%). Since the house rat is usually closely associated with man the animal must be considered as a possible reservoir host."

ERICHSEN, S. & BORGEN, P. H. F. **Histological Examination of the Brains of Dogs with Positive** *Toxoplasma* **Dye Test Titers.** *Acta Path. et Microb. Scandinavica.* 1957, v. 41, No. 5, 358–60.

"530 histological sections from the central nervous system of 8 dogs showing positive dye tests in the range from + 1/4 to + 1/200 ± 1/400 were examined for toxoplasma-like structures. In one case only, with a dye test + 1/200 ± 1/400, 3 possible toxoplasma pseudocysts were found."

Borgen, P. H. F & Björnstad, R. T. **On the Specificity of the *Toxoplasma* Dye Test.** *Acta Path. et Microb. Scandinavica.* 1957, v. 41, No. 5, 361–4. [13 refs.]

"A brief survey of investigations concerning the specificity of the toxoplasma dye test is given. The sera from 13 patients suffering from severe and long lasting infections with trichomonas vaginalis reacted negatively in the dye test. Mice, experimentally immunized with trichomonas vaginalis reacted negatively throughout. Infections with trichomonas vaginalis are not believed to provoke the formation of cytoplasm-modifying antibodies, thereby supporting the view that the Sabin-Feldman toxoplasma dye test has a great specificity in these latitudes."

DERMATOLOGY AND FUNGUS DISEASES

Lapeyssonnie, L., Séchadry & Nioguy. Tumeurs nasales à *Rhinosporidium*. [**Nasal Tumours due to *Rhinosporidium***] *Méd. Trop.* Marseilles. 1957, Nov.–Dec., v. 17, No. 6, 881–4, 3 figs.

An account of 3 cases.

Indian J. Dermat. 1957, Oct., v. 3, No. 1, 5–71, numerous figs. [Numerous refs.] [**Diseases due to Fungi**]

This number of the *Journal* consists of an editorial and 21 papers devoted to mycotic infections of the skin. They deal mostly with the cosmopolitan mycoses but readers of this *Bulletin* will be interested chiefly in those cited below.

Mohammed El Zawahry [pp. 15–17, 37] from Cairo describes a case of blastomycosis of 10 years' standing which clinically resembled a sarcoma.

A. K. Das, M. K. Chatterjee and B. M. Deb Sikdar [pp. 18–22] describe a case clinically suggestive of coccidioidomycosis; bodies similar to spherules of *C. immitis* were found in the discharges and in histological sections, but the coccidioidin test was not available. They know of no record of the disease in India hitherto.

G. Panja and S. N. Chaudhuri [pp. 24–26] report a case of the melanoid (black) variety of mycetoma of the foot in a patient in Bengal, due to *Glenospora semoni*.

K. D. Lahiri [pp. 27–28] gives an account of 3 cases of rhinosporidiosis in Bengal. While this condition is rare in that Province, it is not uncommon in India. *H. J. O'D. Burke-Gaffney*

Hyde, L. & Holman, D. C. **Coccidioidal Spontaneous Pneumothorax.** *Ann. Intern. Med.* 1957, Dec., v. 47, No. 6, 1234–42, 4 figs. [18 refs.]

"1. A case of coccidioidomycosis with spontaneous hydropneumothorax is reported. This is a rare complication and may occur with or without preceding pulmonary cavity. The patient being reported was treated with thoracentesis and resection of his coccidioidal pulmonary cavity. The postoperative course was completely uneventful, and he has returned to his work and normal activity.

"2. Except in unusual cases, the fear of possible spontaneous pneumothorax should not be considered as an indication for resection of a coccidioidal pulmonary cavity. The same would apply to the fear of dissemination in the presence of a pulmonary cavity, since this is extremely rare.

"3. Although some observers feel that surgical resection is indicated for persistent coccidioidal cavitation, many physicians believe that the vast majority of coccidioidal cavities are not dangerous either to the patients or to those around them, and that surgery is indicated only infrequently. Resectional surgery is recommended for *recurrent severe* hemoptysis and for very large cavities (over 4 cm. in diameter), especially when these are located peripherally.

"4. Resection of a coccidioidal pulmonary cavity may be followed by reappearance of a coccidioidal cavity in other areas of the lungs or other complications."

TROPICAL OPHTHALMOLOGY

Oomen, H. A. P. C. **The Incidence of Xerophthalmia in Java in relation to Age and Sex.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1957, Dec., v. 9, No. 4, 357–68, 4 figs. & 4 graphs. [29 refs.]

Over 7,000 cases of xerophthalmia, diagnosed by ophthalmologists in Jogjakarta and Semarang in Central Java, were examined regarding sex and age distribution. The incidence in both cities showed similar trends. The incidence through the first year was 4%, while 80% occurred in the second to the sixth year; in several sub-divisions the peak frequency was towards the end of the third year. The affection is thus a typical disease of the toddler period.

Keratomalacia could not be reliably separated from the other manifestations of xerophthalmia. It was probably most prevalent in the youngest age-groups. The male fraction of xerophthalmia in the first and second half year was different (0·66 and 0·52 respectively). A reservation is made that age and sex distribution in keratomalacia may be different from

xerosis conjunctivae et corneae; and that differences from the rates in older children may occur during the first year.

It is believed that protein deficiency of the early diets, poor carotene utilization and infectious diseases are responsible for the high frequency in the toddler period. The two different attack rates, with increasing age in the sexes, are attributed to sexual differences in requirement or availability of vitamin A.

The present endemicity of xerophthalmia in Central Java closely resembles the endemicity in Japan described by Mori in 1904.

The paper is illustrated with a number of tables, graphs and photographs. *D. P. Choyce*

Hagino, R., Suzumura, A., Nishigaki, C. & Nomura, A. **Clinical Diagnosis of Trachoma by Color-Slides.** *Ann. Rep. Res. Inst. Environmental Med. Nagoya Univ., 1956.* 1957, 1–9, 15 coloured figs. on 2 pls. [11 refs.]

The authors have developed a series of colour slides to assist in the clinical diagnosis of trachoma, as applied to the mass examination of children in the nursery, primary and secondary schools.

They feel that the colour slide is as effective as the infra-red photograph in the differentiation of true trachoma from trachoma dubium.

D. P. Choyce

See also p. 434, Rodger, **Posterior Degenerative Lesion of Onchocerciasis.**

See also p. 464, Gratama & van Thiel, **Ocular Localization of *Armillifer armillatus*.**

MISCELLANEOUS DISEASES

Derrick, E. H. **The Challenge of North Queensland Fevers.** *Australasian Ann. of Med.* 1957, Aug., v. 6, No. 3, 173–88, 16 figs. [Numerous refs.]

This paper was based on an address delivered at a meeting of the National Association for the Prevention of Tuberculosis in Australia, but tuberculosis was not one of the fevers referred to in the title. North Queensland is in the tropics, and the coastal areas are subject to heavy rainfall. The author relates the fevers to latitude and rainfall—leptospirosis is prevalent where the rainfall is over 90 inches per annum though

it occurs elsewhere, scrub typhus where it exceeds 60 inches, tick typhus and hookworm infection 45 inches. Malaria occurs north of latitude 19°, scrub typhus north of 21·5°, tick typhus 28°, filariasis 30°, hookworm 32°, dengue 33·4° and Murray Valley encephalitis north of 37·25°.

He goes on to an account of the Australian Institute of Tropical Medicine, founded in Townsville in 1910 and in operation until 1930 when its research and teaching functions were transferred to Sydney. The history of " fever " is traced from about 1860, and through the period of exploration and development of the country. In the early days typhoid was prominent, and for difficult cases the diagnosis of " typho-malaria " was popular; it was later found to be clinically identical with scrub typhus. As usual local names were given to these fevers—gulf fever, colonial fever, Mossman fever, cane fever, coastal fever, Sarina fever—and it required much research to disentangle their aetiology. For this work the credit should go to the many men whose names are mentioned in the paper [and not least, the abstracter may add, to the author himself]. Some of the fevers have gone or almost gone as sanitation and the control of vectors have improved, but scrub typhus still provides a steady stream of cases, and effective control of leptospirosis is not in sight.

This is an interesting and important recapitulation of some notable scientific achievements. *Charles Wilcocks*

Dannenberg, A. M., Jr. & Scott, Eva M. **Melioidosis: Pathogenesis and Immunity in Mice and Hamsters. I. Studies with Virulent Strains of** *Malleomyces pseudomallei*. *J. Exper. Med.* 1958, Jan. 1, v. 107, No. 1, 153–66, 22 figs. on 11 pls. [33 refs.]

Chen, K. K., Anderson, R. C., McCowen, M. C. & Harris, P. N. **Pharmacologic Action of Hypoglycin A and B.** *J. Pharmacol. & Exper. Therap.* 1957, Nov., v. 121, No. 3, 272–85, 5 figs. [Numerous refs.]

" Two peptides, hypoglycin A and B, of the fruit of *Blighia sapida*, have been shown to induce hypoglycemia in rabbits, monkeys, rats and mice upon intravenous injection. Hypoglycin A is more potent than B. Cats, dogs and pigeons appear to be refractory to the doses studied.

" In rats at least, hypoglycin A is effective by mouth. The blood sugar of aloxanized rats also falls after hypoglycin A.

" Mice, rats and monkeys receiving lethal doses of either hypoglycin A or B frequently develop fatty metamorphosis of the liver as well as some pathological changes of other viscera.

" The liver glycogen of mice after hypoglycin A or B tends to be lower than that of the controls. In rabbits, the stainable liver glycogen granules disappear after intravenous injection of hypoglycin A. However, the

mouse liver is apparently capable of synthesizing glycogen after administration of the peptides when glucose is injected at half-hour intervals.

"The mechanism of action of hypoglycin A and B on carbohydrate metabolism is not the same as that of insulin.

"Hypoglycin A causes vomiting in pigeons, cats and dogs when injected intravenously. Emesis also occurs with hypoglycin B in pigeons—the only species of animals investigated."

[See this *Bulletin*, 1955, v. 52, 691, 935.]

Saha, T. K. & Chaudhuri, R. N. **Hepatic Pathology in Tropical Splenomegaly.** *Indian J. Med. Sci.* 1957, Sept., v. 11, No. 9, 704–7, 15 figs. on 3 pls.

PARASITOLOGY: GENERAL

Horton-Smith, C. [Edited by.] **Biological Aspects of the Transmission of Disease.** pp. viii + 184. 1957. Edinburgh: Oliver & Boyd, Tweeddale Court. London: 39a, Welbeck Street, W.1. [21s.]

Everyone is aware of the importance of keeping a broad view of transmissible disease, and of the stimulation and insight which can be gained from any new facts concerning host-parasite relationships. But specialized terminologies and concepts are formidable obstacles, to say nothing of the question of time. It is therefore gratifying to find in this book, which contains 22 papers contributed to a symposium organized by the Institute of Biology in 1955, a collection of material which should interest and enlighten most workers who are concerned with problems of parasitic infection. Each paper is a short review of factors which influence the transmission of a particular group of parasites, the writers being authorities in their special fields. It would have been easy for such an undertaking to have resulted in a dish of tough and uncompromising components, liable to deter those of delicate appetite. This has not happened. By a judicious selection of subjects and modes of expression, a wide range of phenomena has been happily illuminated in language which is generally clear, seldom dull, and sometimes memorable (who could forget S. D. Garrett's reminder that the soil can be all things to all men, or F. C. Bawden's observation that the word "honeymoon" implies a degree of commensalism sadly lacking in the phrase 'the honeymoon is now over"?).

These essays by mycologists, protozoologists, bacteriologists, virologists and helminthologists give an admirable account of what has been revealed in regions where exploration is vigorous. They deal with the direct and

indirect transmission of disease in man, animals and plants, more specifically with bacteria (Cruickshank, R.; Lovell, R.; Crosse, J. E.), the dispersal of fungi (Ainsworth, G. C.; Austwick, P. K. C.; Garrett, S. D.; Lund, J. W. G.), the transmission of coccidia (Horton-Smith, C.), amoebae (Neal, R. A.), trypanosomes (Hoare, C. A.), haemosporidia (Garnham, P. C. C.), helminths (Bertram, D. S.; Kershaw, W. E.; Standen, O. D.; Taylor, E. L.), and viruses (Andrewes, C. H.; Barwell, C. F.; Bawden, F. C.; Dick, G. W. A.), and certain features of parasitic infections (Beveridge, W. I. B.; Noble, M.; Moore, W. C.). All are of a high standard, and it would be hard to imagine a reader who could fail to profit from the variety of information which has been assembled on a general topic of such interest and importance. The book also contains a record of discussions which followed some of the papers, where constructive exchanges of views took place between workers in different branches of pathology. One can well accept the statement in the foreword, that "unsolicited appreciation . . . was expressed by speakers and audience alike". *R. S. F. Hennessey*

Deblock, S. & Capron, A. Le parasitisme intestinal en milieu psychiatrique dans le Nord de la France. II.—Les parasitoses détectées par l'examen coprologique de 536 malades dont 524 adultes. Considérations sur la transmission de quelques parasites à formes de dissémination immédiatement infestantes. [**Intestinal Parasitism in a Psychiatric Environment in the North of France**] *Bull. Soc. Path. Exot.* 1957, July–Aug., v. 50, No. 4, 533–7.

In a recent note [this *Bulletin*, 1958, v. 55, 198] Biguet *et al.* showed that enterobiasis in a psychiatric institution could reach 53–54% in adults. The present authors have studied the spread, among patients in the same establishment at Armentières, of other intestinal parasites, the cysts or eggs of which can be detected by faecal examination. Only one portion of faeces could be examined and this was examined successively in physiological saline, Lugol's iodine and by the Telemann-Rivas technique.

536 patients were examined, of whom 524 were over 18 years old. 130 (23·88%) were infected. The percentages of parasites found were:

Parasite	*No. of patients infected*	*Percentage of total no. of patients (total: 536)*	*Percentage of patients parasitized (130)*
Entamoeba coli	57	10·63	44·53
Giardia intestinalis	42	7·83	32·81
Trichuris trichiura	46	8·58	35·93
Ascaris lumbricoides	8	1·49	6·25
Hymenolepis nana	7	1·30	5·46

Taenia saginata occurred in one patient, but could not be detected by faecal examination.

The authors conclude that, while the deplorable hygiene among psychiatric people favours the spread of parasites, two other factors help to explain the low incidence they found. Distribution of manure on land is not practised in the psychiatric clinic at Armentières. *Ascaris* and *Trichuris* were probably acquired before entry into the clinic and in time the patients lose these spontaneously. *Giardia* and *Entamoeba*, unlike *Ascaris* and *Trichuris*, do not need a sojourn in the external medium before they become infective. Patients may therefore, in addition to swallowing the eggs or cysts of these two species, transfer the eggs or cysts by hands contaminated by faeces either to the foods of the community or to their own mouths. This may be especially important among children or psychiatric patients and its importance was suggested by a study, made by Coutelen *et al.* [this *Bulletin*, 1956, v. 53, 195] who found that 62·5% of a community of children were infected with *Giardia* and that rapid re-infection occurred when treatment with quinacrine [mepacrine] was given, in spite of the fact that the establishment in which the children were had modern kitchens and the vegetables were washed especially carefully.

In the present examination at Armentières the authors found 7 carriers of *Hymenolepis nana*, 3 of whom were children; they all lived in the same house, in which 113 patients were examined, so that the 7 carriers represented an infection rate with *H. nana* of 6·19%. Probably all these 7 patients had been infected inside the psychiatric establishment by one of them who had acquired the infection before admission, infection being passed by hands soiled with faeces to the person or food of the other patients.

G. Lapage

Zemberzuski, K. Masowe badania parazytofauny przewodu pokarmowego człowieka w Polsce rok 1955. [**Mass Investigations of the Parasitic Fauna of the Alimentary Tract of Man in Poland, in 1955**] *Wiadomości Parazytologiczne*. Warsaw. 1957, v. 3, No. 6, 575–86.

The English summary appended to the paper is as follows:—

"In 1955 the district sanitary-epidemiological stations have examined 40678 persons in different regions of Poland. These examinations gave following results as to parasitic infections of the population: *Taenia solium*, *Taenia saginata*, *Hymenolepis nana*—0·3 per cent, *Ascaris lumbricoides*—5·4 per cent, *Trichuris trichiura*—10·1 per cent, *Enterobius vermicularis*—16·5 per cent. Among 31215 persons examined on *Lamblia intestinalis* 5·4 per cent were found to be infected with this parasite.

"The greatest spread of cylindrical worms was recorded in following districts: Cracow distr. (*Ascaris lumbricoides* 21·4 per cent, *Trichuris trichiura* 27·8 per cent), Rzeszów distr. (*Ascaris lumbricoides* 22·1 per cent), Lublin distr. (*Trichuris trichiura* 20·6 per cent), Zielona Góra distr. (*E. vermicularis* 54·9 per cent) and Łódź distr. (*E. vermicularis* 50·2 per

cent). Tapeworms, instead, were most frequently found in the Zielona Góra district.

"Numerous invasions of *Lamblia intestinalis* were found in the Warsaw-city and in the Rzeszów as well as Katowice districts.

"The greatest spread of *Enterobius vermicularis* and *Ascaris lumbricoides* was observed at the elementary school age (7–14 years), and of *Lamblia intestinalis* at infant age (0–3 years). *Trichuris trichiura* was mostly recorded among pupils of secondary schools (14–18 years) and tapeworms found in persons over 18 years of age.

"Cylindrical worms (*A. lumbricoides*, *Trichuris trichiura*, *E. vermicularis*) were most often encountered among rural populations; tapeworms, however, and *Lamblia intestinalis* were more frequently recorded in cities."

Biagi F., F. & Portilla, J. **Comparison of Methods of examining Stools for Parasites.** *Amer. J. Trop. Med. & Hyg.* 1957, Sept., v. 6, No. 5, 906–11, 1 fig.

The authors made simultaneous faecal examinations of 400 faecal samples from 200 people by the methods of Faust *et al.* [this *Bulletin*, 1940, v. 37, 62], Bayona (*Ciencia* (*Méx.*), 1955, v. 14, 265), Ferreira & Abreu, cited by Coutinho *et al.* [this *Bulletin*, 1955, v. 52, 558] and Baermann. They also made direct examinations in saline with Lugol's iodine. The methods of Bayona, Ferreira and Baermann as used by the authors are described.

Of the samples examined, 103 were negative. In the remainder at least 1 method revealed one or more of 18 common species of intestinal parasites.

In general helminthiases were diagnosed in all subsequent examinations of positive cases, but protozoal infections were not; they appeared irregularly and required more than one examination. Table 2 shows the percentage of positive samples found by the different methods used and it shows the percentages in which trophozoites (found only by direct examinations), cysts, eggs and larvae or infertile eggs of *Ascaris* were found. The percentage positives for cysts, eggs and larvae by direct examination was low (cysts 57·4%, eggs and larvae 42·1%) and, by the Ferreira method, rather higher (cysts 95·8%, eggs and larvae 97·4%). The Ferreira method was the best for detecting infertile *Ascaris* eggs, direct examination being better than Faust's method for these. When few eggs (less than 50 per preparation) were present, the Ferreira method gave 94·1% of positives and was better than the Bayona method (72·3%), the Faust method (62·4%) and direct examination (8·9%). This is, as Table 5 shows, important for the diagnosis of strongyloidiasis and fasciolíasis (in both of which egg-production is low) and the Ferreira method could, the authors think, be used for the diagnosis of schistosomiasis.

The stools examined had, in general, many eggs and cysts and Table 5

shows that the Ferreira method gave very rich concentrations of cysts and, when eggs and larvae were too numerous to be counted, the concentration by this method was 17·9 times more than that given by the Faust method.

The Ferreira method is used in the Hospital Infantil, Mexico City, where 1,500 stools a month are examined by it. The authors explain their method of washing the Pyrex tubes and the funnels used, so that no eggs or cysts are left on them after use. The Bayona method gives satisfactory concentrations and the material floated up is collected in the quickest way; the Baermann method was useful only for the detection of larvae and it gives notably higher concentrations of these than the other methods do. *G. Lapage*

Hamperl, H. **Variants of Pneumocystis Pneumonia.** *J. Path. & Bact.* 1957, Oct., v. 74, No. 2, 353–6, 7 figs. on 3 pls.

Pneumocystis pneumonia is an epidemic disease of premature or debilitated babies in the first three months of life. Pathological changes include inflammatory alveolar septal infiltration predominantly with plasma cells. The parasite, *Pneumocystis carinii*, is found in the alveoli and can be identified by the periodic-acid-Schiff method for staining mucopolysaccharides.

The author reports a fatal case in a 6-month-old child diagnosed as suffering from interstitial pneumonia. The patient died from aspiration of food. At autopsy the lungs were pale grey-red. The lung septa were thickened and contained lymphocytes and plasma cells. Some of the alveoli were filled with lymphocytes and fat-laden alveolar cells. The latter contained " rounded structures about the size of a pneumocystis vesicle ", staining with periodic-acid-Schiff. No typical vesicles were found but the author concludes that in this case the parasites had degenerated after phagocytosis by the epithelial alveolar cells. In some of the cases described by other workers, large numbers of *Pneumocystis* were found in the alveoli without interstitial inflammatory infiltration, presumably because in the debilitated children concerned the intensity of infection inhibited the tissue response.

[See also this *Bulletin*, 1956, v. 53, 668.] *B. G. Maegraith*

Brzosko, W. & Kapuścińska, W. **Experimental Pneumocystic Pneumonia in Animals. I.** *Bull. Acad. Polonaise des Sci.* Warsaw. *Sér. Sci. Biol.* 1957, v. 5, No. 2, 53–5, 4 figs. on 2 pls.

The authors set out to devise an experimental method of producing *Pneumocystis* infection in laboratory animals, principally for the purpose of establishing chemotherapeutic trials.

Guineapigs were fed on a diet deficient in vitamin C (which is described),

and then daily for 7 days the animals' mouths were dipped in a homogenized lung suspension taken from autopsy material in a case of pneumocystic pneumonia. After 6 days the animals began to lose weight and they died in 8 to 12 days. Microscopic examination of the lungs showed inflammatory foci, with colonies of *Pneumocystis carinii* in the lumen of the alveoli, in the interalveolar septa and in the small bronchioles. The appearances are shown in 3 photomicrographs and compared, in a fourth, with those seen in the lungs of a human case in an infant. The picture in guineapig lungs was much like that seen in children and differed only in the extent of the pathological changes, presumably because of the rapidly fatal course of the disease. No such changes were seen in animals receiving the diet alone. *H. J. O'D. Burke-Gaffney*

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Gilbert, I. H. & Gouck, H. K. **Influence of Surface Color on Mosquito Landing Rates.** *J. Econom. Entom.* 1957, Oct., v. 50, No. 5, 678–80, 2 figs.

A comparison was made of the numbers of mosquitoes landing, after disturbance, on 10 cm. disks of filter paper of different shades or colours, suspended in cages illuminated from below. Each colour or shade was produced by water solutions of food—colouring material, or cloth dye, absorbed into the filter paper. The results are summarized by determining the ratio of the number of mosquitoes landing on a white disk to the number landing on a coloured disk, and plotting this against foot candles of reflected light. With various shades of any one colour *Aëdes aegypti* was found to be attracted more by darker shades than by lighter, whereas *A. taeniorhynchus* was more attracted by lighter shades than darker. In *A. sollicitans* the darker shades of the brighter colours (red and orange), and the lighter shades of colours containing blue, were more attractive. When colours of equal brightness, reflecting 40 foot candles were used, yellow was significantly more attractive than orange and red, and these three colours were significantly more attractive than green, violet, black, blue and white to *Aëdes aegypti*. At 20 foot candles white was significantly less attractive than all the other colours. White was significantly most attractive at both 40 and 20 foot candles to *A. taeniorhynchus*, whereas white was least attractive to *A. sollicitans* at 40 foot candles, but at 20 foot candles *A. sollicitans* appeared to be unable to distinguish between colours. *B. R. Laurence*

Colless, D. H. **Components of the Catch Curve of *Culex annulus* in Singapore.** [Correspondence.] *Nature.* 1957, Dec. 28, v. 180, 1496–7, 2 figs.

27 all-night catches were made at quarter-hour intervals of *Culex annulus* entering through the open door of an otherwise mosquito-proof stable in which a horse was confined. Altogether, 1,807 mosquitoes were caught, most of them while resting on the walls before feeding.

The tabulated and graphed observations agree with a theoretically derived equation and suggest the random arrival of the mosquitoes, or else their orientation by variable influences becoming randomized over a series of catches.

The fall shown in the catch curve represents the depletion of the population of unfed mosquitoes by their fixation at the bait and it seems probable that such a " depletion curve " is a component of the biting cycles of most mosquitoes, the more distinctive features being the effects of other components such as cycles of activation to flight and feeding activity. *H. S. Leeson*

Ghelelovitch, S. Deux cas de gynandromorphisme chez *Culex autogenicus* Roubaud. [**Two Cases of Gynandromorphism in *Culex autogenicus***] *Ann. Parasit. Humaine et Comparée.* 1957, July–Sept., v. 32, No. 4, 432–7, 2 figs.

Callot, J. Sur *Culex torrentium* Martini. [**Notes on *Culex torrentium***] *Ann. Parasit. Humaine et Comparée.* 1957, July–Sept., v. 32, No. 4, 438–42, 1 fig.

Lariviere, M. & Abonnenc, E. Premières données biologiques concernant deux espèces de simulies (*S. adersi* et *S. ruficorne*) observées pour la première fois dans la presqu'île du Cap Vert. [**Preliminary Biological Data on *Simulium adersi* and *S. ruficorne* Detected for the First Time in Cape Verde Peninsula**] *Bull. Méd. de l'A.O.F.* Dakar. 1956, v. 1, No. 4, 317–21.

Hopkins, T. L. & Robbins, W. E. **The Absorption, Metabolism, and Excretion of C^{14}-Labeled Allethrin by House Flies.** *J. Econom. Entom.* 1957, Oct., v. 50, No. 5, 684–7. [10 refs.]

The authors have conducted experiments rather similar to those of Winteringham *et al.* (*Biochem. J.*, 1955, v. 61, 359) in which radio-active pyrethroid insecticides were applied to house-flies, with and without synergist. The amounts penetrating were assessed, from the radioactivity

of residue from solvent used to wash the flies, after suitable periods up to 24 hours. Internal pyrethroids were extracted from macerated flies and separated by paper chromatography from metabolic products. The present authors also collected excrement from treated flies for the same kind of test.

Both investigations showed that natural and synthetic pyrethroids were very largely absorbed by flies in 24 hours and both agreed that the rate of absorption was somewhat reduced by the presence of synergist (piperonyl cyclonene or butoxide). It was suggested that this is a simple dilution effect of the large quantity of synergist present. The present authors also showed that excretion of radio-active material (from allethrin treatment) was also reduced by synergist (44 to 36%, at 24 hours). Both investigations detected very high metabolism of pyrethroid material over a 24-hour period. The results of Wintringham *et al.* suggest that the synergist largely suppressed metabolism of the insecticide to a degree consistent with the increased toxic action; they found this effect more pronounced with natural pyrethrins than with allethrin. The present authors, however, detected no difference in the degradation of allethrin due to piperonyl butoxide. *J. R. Busvine*

Milani, R. & Travaglino, Angela. Ricerche genetiche sulla resistenza al DDT in *Musca domestica* concatenazione del gene kdr (Knockdown-Resistance) con due mutanti morfologigi. [**Genetic Research on Resistance to DDT in** *Musca domestica*. **Linkage between** *Kdr* **Gene and Two Morphological Mutants**] *Riv. di Parassit.* Rome. 1957, July, v. 18, No. 3, 199–202.

The inheritance of resistance to insecticides has in the majority of cases been examined by non-geneticists, and this has led to several misconceptions of the techniques and vocabulary of the geneticist [Milani, this *Bulletin*, 1957, v. 54, 1255].

The formal genetics of *Musca domestica* are not extensive and the research reported here shows that the genes *bwb* (brown body), *dv* (divergent wings) and *kdr* (DDT knockdown resistant) are in the same linkage group. *Bwb* and *kdr* both show frequencies in accordance with a monofactorial character, but *dv* has too low a frequency of occurrence which is due to incomplete penetrance of the gene. This fact is accounted for in the linkage experiments.

The results vary according to the cross, showing that the frequency of crossing over in the male gametogenesis is much lower than in the female.

From the progeny of the female heterozygote, it is suggested that the order of the genes is *bwb*, *dv*, *kdr*, but the distances between the loci are too great for a sure interpretation.

A fuller report on these experiments is to follow. [See also this *Bulletin*, 1955, v. 52, 1025.] *C. Elizabeth Jackson*

Ascher, K. R. S. **Enhanced Susceptibility of a DDT-Resistant Strain of Houseflies towards Alkyl and Aryl Bromoacetates.** *Riv. di Parassit.* Rome. 1957, July, v. 18, No. 3, 185–97. [14 refs.]

A DDT-resistant and a normal strain of *Musca vicina* Macq. (R and T) and a polyvalent-resistant and a normal strain of *Musca domestica* L. (K_1 and T_1) were exposed by tarsal contact to deposits of chloro-, bromo-, and iodoacetic acids and some esters of bromoacetic acid. Of the acids tested, bromoacetic showed the greatest contact activity. On exposure to this R showed a quicker knockdown than T.

Decyl, dodecyl, myristyl and cetyl bromoacetate and some aromatic esters had a certain residual contact action and again were more toxic to the R strain. Where K_1 and T_1 were tested against these esters the susceptibility level was about the same as R and T, but in all cases (except cetyl bromoacetate), the knockdown was quicker in the T_1 (susceptible strain). This may be attributed to the " fat barrier " existing in the K_1 strain.

It is admitted that the residual contact action of the four alkyl bromoacetates is much too weak and of too short a duration to be of any practical value. *R. J. Wood*

Sacca, G. La resistenza di *Musca domestica* L. agli esteri fosforici in provincia di Latina. [**Resistance of *Musca domestica* to Organo-Phosphorus Compounds in the Province of Latina**] *Riv. di Parassit.* Rome, 1957, Oct., v. 18, No. 4, 289–92.

Since chlorinated insecticides have proved useless for fly control in Italy since 1950, tests were made of organo-phosphorus compounds. In the province of Latina, Diazinon was chosen for practical application. It was used in the form of a paste (also containing DDT) and sprayed in houses at the rate of 200 mgm. per m^2. The residual action being about 2 months, it was found that 2 treatments per season generally sufficed. This remained satisfactory until the end of the summer of 1956, when failures were noted in the field. Resistance to organo-phosphorus insecticides had already been reported by Keiding from Denmark [this *Bulletin*, 1956, v. 53, 1394]. Accordingly, laboratory experiments were done to test for resistance and to measure its degree, persistence and distribution in the province. The tests were done on laboratory-reared flies derived from wild-caught females, by exposing them to residues of Diazinon deposited on filter paper from trilene solutions. By experiments with different residues, an LD50 for each strain was determined.

The results showed that flies from Latina were between 5 and 60 times as resistant to Diazinon as the normal laboratory colony. Resistance was highest in the centre of the province and lower at the periphery. (Latina is a coastal strip about 120 × 20 km.) Resistance persisted in the field throughout 1957, without much change. A colony reared in the laboratory retained high resistance for 10 generations. *J. R. Busvine*

Leclercq, M. Révision systématique et biogéographique des Tabanidae (Dipt.) de France, II. [**Systematic Review and Biogeographical Observations on Tabanids in France. II**] *Ann. Parasit. Humaine et Comparée.* 1957, July–Sept., v. 32, No. 4, 398–431. [Numerous refs.]

Cole, M. M., Couch, M. D., Burden, G. S. & Gilbert, I. H. **Further Studies on Resistance of Human Body Lice to Insecticides.** *J. Econom. Entom.* 1957, Oct., v. 50, No. 5, 556–9.

This paper describes further work, in the same laboratory, with a DDT-resistant strain of lice from Korea described earlier [Eddy *et al.*, this *Bulletin*, 1956, v. 53, 564]. The methods of selecting for resistance and of testing were, as before, by exposing lice on cloth impregnated by acetone solutions of insecticide. In the earlier paper it was stated that when the original resistant colony was reared in the absence of DDT, all resistance was lost in 8 generations. However, a different result was obtained after the tolerance of the resistant strain had been intensified by rearing for 17 generations on DDT-impregnated cloth. At this stage, a sub-colony removed and reared without exposure to DDT lost only part of its resistance in 15 generations, but no more, up to the 45th generation.

The selected resistant colony was reared on DDT up to the 70th generation and then tested for resistance to DDT analogues. It was then virtually immune to DDT, Br-DDT [bromine analogue], DDD (TDE) and Prolan, which were all highly toxic to the normal strain. Only slightly enhanced resistance was shown to F-DDT (DFDT) [fluorine analogue]. methoxychlor and to 1,1-bis chlorphenyl ethane. The compounds DMC (Dimite) and chloro-bis-(*p*-chlorphenyl) methane, which have shown synergic action with DDT against certain resistant house-flies, were tested against the resistant lice. They had no effect on the highly resistant selected colony and only slight action on the colony removed from DDT for many generations.

Attempts to induce resistance by rearing lice for 26 generations on very low, non-lethal rates of DDT, gave less than two-fold increase in tolerance. Other colonies reared for 13 to 35 generations on concentrations of lindane, Lauseto neu, Strobane or synergized pyrethrins, also gave little appreciable increase in resistance. *J. R. Busvine*

Sasa, M. & Wakasugi, M. **Studies on the Effect of Carbon Dioxide as the Stimulant on the Tropical Rat Mite, *Bdellonyssus bacoti* (Hirst, 1913).** *Japanese J. Exper. Med.* 1957, Aug., v. 27, No. 4, 207–15, 2 figs.

The principles of a technique described in work on trombiculids [this *Bulletin*, 1958, v. 55, 143] are applied to similar studies on *Bdellonyssus bacoti* [*Ornithonyssus bacoti* of some recent authors]. The bare cone of

the former apparatus, on the peak of which the trombiculids clustered, is covered by two layers of gauze under which, in the absence of a stimulus to be active, *B. bacoti* retreated, thus exhibiting negative phototaxis and probably also thigmotaxis. When activated by a suitable stimulus they swarmed out to the top of the upper gauze where they could be counted. This is the basis of numerical comparison of stimulating factors. As in the case of *Trombicula*, light changes, sound vibrations, heat (up to 40°C.), or air movements failed to bring the mites to the surface layer; various volatile chemicals were also negative in effect. Ordinary laboratory air, carbon dioxide, and breath were, however, stimulants. Carbon dioxide appears to have been the critical component and would stimulate if diluted (with "fresh air") 25 times. Lesser concentrations of CO_2 were partly or wholly ineffective. *B. bacoti* is, by comparison with *Trombicula*, less sensitive to carbon dioxide stimulations. The response of *B. bacoti* to a stimulus (human breath) was reduced progressively with successive stimulations at half-hour intervals. When stimulated, the mites (in the starved state) showed negative geotaxis in climbing towards the top of the cone. These experiments explain something of the behaviour of this mite in artificial rat nests maintained by the authors.

[The abstracter has also frequently seen in such nests how a nest vacated by its host rat may seem to contain few if any mites at first, but may, within a minute or so of being breathed into by the observer, swarm with very large numbers of hungry mites which concentrate at the upper layers or strands of bedding material. Use is made of this response for rapid collection by a suitable sucking device.] *D. S. Bertram*

Gratama, S. & van Thiel, P. H. **Ocular Localization of** *Armillifer armillatus*. *Documenta Med. Geograph. et Trop.* Amsterdam. 1957, Dec., v. 9, No. 4, 374–6, 1 fig. [16 refs.]

"Description of a second case of ocular localization of the nymph of *Armillifer armillatus* in an indigenous boy in Liberia. The parasite lay coiled in a round swelling in the conjunctival sac, without troubling the patient."

MISCELLANEOUS PAPERS

Geber, Marcelle & Dean, R. F. A. **Gesell Tests on African Children.** *Pediatrics*. Springfield, Ill. 1957, Dec., v. 20, No. 6, 1055–65, 1 fig.

"The results of a series of Gesell tests on African infants and children are presented.

"The most remarkable finding was the precocity of the younger infants.

The motor development was greatly in advance of that of European infants of the same age, but was not an isolated phenomenon; it was paralleled by advanced adaptivity, language and personal-social behaviour.

" The precocity was usually lost in the third year, but was retained by some children who had the advantages of a kindergarten.

" The results of the Gesell tests were confirmed by a study of newborn African infants, whose state of development was also precocious by European standards.

" The findings are discussed in relation to some details of the African environment, and especially to some local customs which may affect early development. Emphasis is placed on the potential value of finding means by which the early precocity could be maintained."

[See this *Bulletin*, 1957, v. 54, 1374.]

PIMSTEIN LAMM, A. Resumenes de los articulos publicados en la *Revista Chilena de Higiene y Medicina Preventiva* desde 1937 hasta 1953 inclusive. Volumenes I al XV. Fasciculo primero. Vol. I (1937–1938) y Vol. II (1939) con indices de materias y autores. [**Review of Articles Published in the** *Revista Chilena de Higiene y Medicina Preventiva* **from 1937 to 1953. Vols. I and II**] 79 pp. 1957. Santiago de Chile: Biblioteca Central del Servicio Nacional de Salud.

REPORTS AND SURVEYS

DAVIDSON, W. S. **Health and Nutrition of Warburton Range Natives of Central Australia.** *Med. J. Australia.* 1957, Oct. 26, v. 2, No. 17, 601–5, 2 figs. [19 refs.]

This paper reviews the results of a medical survey carried out among aborigines in the Warburton Range area of Western Australia [dates not stated]. Field work included general clinical, anthropometric and ophthalmological observations, and taking of blood samples. Laboratory work was done in Perth.

Signs of nutritional deficiency in the 300 people examined were not prominent. Some mild glossitis was seen in a few and spongy gums were observed in 7. The latter occurred in town or mission areas, where " it is possible that too much reliance was being put on rations . . . and that foraging for berries, etc., had been receiving less attention ". Oedema of the feet and ankles was seen in 7 of 49 infants examined; in 2 it was more generalized, and the clinical condition resembled kwashiorkor. The author gives evidence supporting the view that there is a lack of suitable dietary supplements during and after the weaning period.

Haemoglobin values and serum protein estimations gave no evidence of " even a mild deficiency in the diet ".

There was no evidence of syphilis or of leprosy. Mild skin lesions diagnosed as secondary yaws were seen. There were 6 patients with sabre tibia. Out of 66 VDRL cardiolipin flocculation slide tests, 21 were positive. Teeth were good. The liver was one finger's breadth below the costal margin in one child and jaundice was detected in one serum but not clinically. Several children had chronic otitis media.

Other findings included high vitamin B12 concentrations and moderate eosinophilia. With regard to the latter there seem to have been no parasitological studies made, except for looking for head lice.

B. G. Maegraith

DAVIS, R. E. & PITNEY, W. R. **Some Haematological Observations on Aborigines in the Warburton Range Area.** *Med. J. Australia.* 1957, Oct. 26, v. 2, No. 17, 605–8. [17 refs.]

Haemoglobin estimations were made in the field on 46 adult aborigines, and 12 children between 6 and 14 years of age. The mean values were 14·4 and 12·8 gm.% respectively. These values were checked in the laboratory, together with 76 other samples. The mean value was 14·7 gm.%; the figures for males and females were 16·2 gm. and 14·5 gm.% respectively. Red blood cell counts are not quoted. Erythrocytes examined in blood films were normal. Examination of films gave no suggestion of abnormal white counts. Eosinophilia of 3% or higher was noted in nearly half the bloods examined; in 4 films the eosinophilia was greater than 10%. Serum vitamin B12 values were very high in 63 of 140 sera.

The haemoglobin values indicate that anaemia is rare in the aborigines examined. (One man, after ceremonial bleeding, had a haemoglobin concentration of only 4 gm.%.)

The elevated vitamin B12 values were due mostly to increase in the bound vitamin, suggesting increase in binding protein fractions. No evidence of leukaemia or other myeloproliferative disorder was, however, disclosed. There may exist some " geographical factor ". There was no relation between the high B12 values and eosinophilia.

[There is no mention of any survey of parasitic infection in so far as the eosinophilia is concerned. A pointer in this direction is the relatively high incidence of eosinophilia in one particular locality.]

B. G. Maegraith

CURNOW, D. H. **The Serum Proteins of Aborigines in the Warburton Range Area.** *Med. J. Australia.* 1957, Oct. 26, v. 2, No. 17, 608–9. [19 refs.]

The mean values (in gm.%) recorded in specimens from 134 aborigines and 20 Europeans were as follows (European figures in brackets): total

protein, 7·56 (7·05); albumin, 3·78 (3·96); α_1 globulin, 0·20 (0·16); α_2 globulin, 0·76 (0·73); β globulin 0·96 (0·96); γ globulin, 1·88 (1·24).

The slightly high figures for total protein and gamma globulin concentrations are discussed in relation to the normal figures for albumin. The author considers that dietary, racial and infective factors might be involved. The absence of changes in the alpha globulin values does not, in his view, support the last.

[Clinical evidence is largely lacking, especially in regard to parasitization, which is well known to have notable effects on the serum protein pattern.] *B. G. Maegraith*

BOOK REVIEWS

Duren, A. & Gillet, H. Notions élémentaires d'hygiène tropicale à l'usage des habitants du Congo Belge. [**Elements of Tropical Hygiene for Residents of the Belgian Congo**] With a Preface by J. Rodhain. 4th Edition. 149 pp., 30 figs. 1957. Brussels: M. Kivits, 9, rue Bréderode.

This book is written for the guidance of laymen in the Belgian Congo, on both their own health and that of labourers under their charge. In addition to the routines of personal hygiene and avoidance of tropical disease, it deals with the health, nutrition and occupational hazards of Africans, and the requirements of Belgian Congo law with regard to labour welfare. [These provisions, extending to prescribed diets, provision of blankets, etc., make interesting and thought-provoking reading.] Other sections describe the common diseases, their prevention and treatment, first aid, buildings, camp layout, water supply and night soil disposal.

All this information is presented in a book of 150 pages, didactically but with clarity and no appearance of undue compression. It approaches the ideal of the tropical layman's *vade mecum*, and its authors can be congratulated unreservedly. The only criticism offered is that in describing diseases, individual or epidemic, perhaps more attention might be paid to answering the obvious layman's question of what to do until the doctor arrives. Also no mention is made of snakebite; not a very common accident, perhaps, but one on which information is needed rapidly if at all. *B. B. Waddy*

Chatterjee, K. D. [M.D.] **Parasitology (Protozoology and Helminthology) in relation to Clinical Medicine.** 185 pp., 1 diagram & 73 figs. [7 (6 coloured) on 6 pls.] 1957. Calcutta 13: S. Bhattacharyya & Co., 50–2, Dharamatala Street, India. [Rs.12.50.]

In 1952 Dr. Chatterjee published his *Human Parasites and Parasitic Diseases* [see this *Bulletin*, 1953, v. 50, 868] which he has now reduced

to less than a quarter of its former bulk with the purpose of providing a work of suitable size, price and content for the use of students of medical parasitology. Admirers of the parent book will regret the ruthless, though doubtless inevitable, removal of the numerous excellent photographs which were its outstanding feature.

The shortened version opens with a general introductory chapter after which follow sections on the protozoal and helminthic parasites of man, and the book concludes with 4 appendices on useful laboratory techniques. The main facts of the morphology of the various parasites are concisely set forth and their life cycles are illustrated by detailed line drawings. Rather more space is given to the systematic position of the parasites than is necessary for medical students and, on the other hand, the paragraphs on treatment have been reduced to bare lists of drugs without any indication of how, when or why these are to be used. These lists of drugs, which are not up to date, would have been better omitted. The statement that the pre-erythrocytic schizogony of *Plasmodium ovale* has not yet been discovered makes strange reading in 1957. Otherwise the author may be said to have achieved his object in furnishing " a book of ready reference on Parasitology ". *D. R. Seaton*

NOTICE

Consideration has from time to time been given to the question whether it would be desirable to include authors' addresses in the headings of abstracts in the *Bulletins* and it has been decided that the additional time and cost involved would not be justified. Subscribers are advised, however, that the Bureau will, on request, notify them of the name and address of the author of the article, or the publisher of the journal, from which an abstract has been made.

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